PUBLIC WORKS

CITY COUNTY STATE

VOL. 52 NO. 18

Entered as second-class matter at the Post Office, at New York, N. Y., November 22, 1921, under the Act of March 3, 1879.
Published weekly by **PUBLIC WORKS JOURNAL CORPORATION**, 243 West 39th Street, New York, N. Y.
Subscription price $3.00 a year, single copies 10 cents.

PUBLIC WORKS.

CITY COUNTY STATE

A Combination of "MUNICIPAL JOURNAL" and "CONTRACTING"

Vol. 52 May 6, 1922 No. 18

Constructing Prairie du Sac Highway Bridge

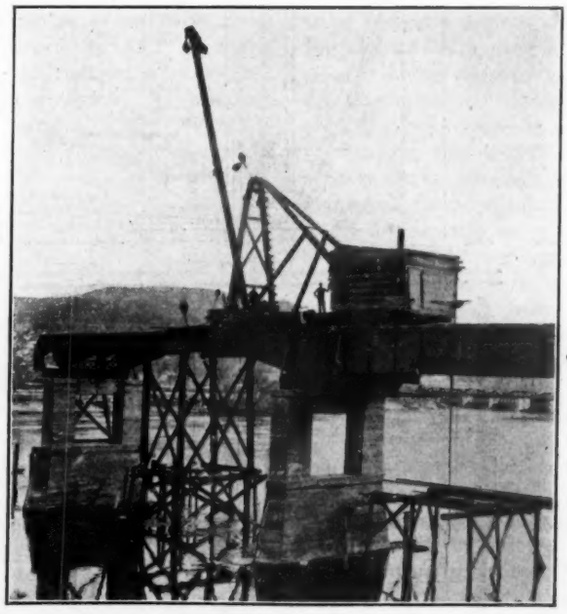
Cofferdam construction of piers and erection of steel by derrick-car and traveler for 18 plate girder spans. Concrete plant for substructure traveled on long trestle falsework.

The highway bridge across the Wisconsin river at Prairie du Sac, Wisc., was built for the Wisconsin Highway Commission by the Kelly Atkinson Construction Co., of Chicago, for a contract price of $175,000. It is 1,427 feet 6 inches long from out to out of steel work and about 1,440 feet long overall. It is on a 2 per cent. grade and the concrete piers and abutments have pile foundations built in cofferdams excavated below the river bottom. The superstructure consists of 17 regular 79-foot plate girder spans and one plate girder 77 foot Scherzer bascule span with a clearance of about 26 feet above high water. The main girders are spaced 21 feet apart on centers. The footings are protected with a rip rap, and the floor of the bascule span is paved with wooden blocks. The fixed spans have reinforced concrete pavement.

SHEET PILE COFFERDAMS.

At low water the depth of the river in the channel is 7 feet and the velocity 4 miles per hour. In high water the depth is 22 feet and the velocity 6 miles. The piers were constructed in cofferdams made of Wakefield sheet piles built up of 2x12-inch planks driven to a maximum depth of 14½ feet below low water level and a penetration of from 6 to 15 feet. The sheet piles were driven by a 2,100-pound drop hammer aided by an hydraulic jet and were pulled by a two-part wire rope tackle aided by the same jet.

The cofferdams were unwatered and the river bottom was excavated to the bottoms of the footings by one Nye steam-driven sand pump with a 4-inch intake that carried about 20 per cent. of the sand with a rise of 20 feet for the suction and 10 feet for the discharge; one Domestic gasoline pump with a 4-inch diaphragm that carried 50 per cent. sand and gravel with a 15-foot suction, and one Cameron test pump with a 3-inch intake, a 12-foot suction and 8-foot discharge that handled only clear water. The pumps were shifted from pier to pier, about 80 feet, by hand, requiring 6 men one hour for the Nye pumps, and four men 10 minutes for the Domestic pumps.



ERECTING BASCULE SPAN WITH TRAVELING DERRICK AND CENTER FALSEWORK TOWER.

FALSEWORK.

For the construction of the substructure the contractor built two service tracks parallel and adjacent to the axis of the bridge. These were carried on falsework with three-pile bents 21 feet apart, spaced to clear the piers. Each bent had one pile 2 feet 6 inches, one pile 12 feet 6 inches, and one pile 20 feet 6 inches from the center line of the bridge. The piles were capped with 12x12-inch transverse timbers carrying 9 lines of 12-inch 33½-pound I-beams borrowed from the permanent floor system of

the bridge superstructure. These I-beams were assembled together in sets of three, side by side, two sets carrying the 10-foot gage traveler track, 7½ feet on centers from the axis of the bridge, and the other group carrying the narrow gage service track on which concrete for the piers and steel for the superstructures were delivered from the shore to the traveler. During construction two cofferdams and 250 feet of the falsework trestle were washed away by a flood.

SAND PLANT.

Sand and gravel up to ¼-inch diameter were excavated by hand from a side-hill pit and delivered in wheelbarrows over a service trestle to an inclined double gravity screen discharging into a 15-yard storage bin with two compartments for gravel and one for sand. The hopper bottoms of the bins discharged into dump buckets on 36-inch gage flat cars hauled 3,000 feet in trains of five by a Milwaukee gasoline locomotive to the end of the bridge and thence to the position of the traveler on the service track, where the four yards of stone and gravel and one yard of sand were delivered to the 6-yard elevated storage hopper. The aggregate train made a 6,000-foot round trip in about 15 minutes.

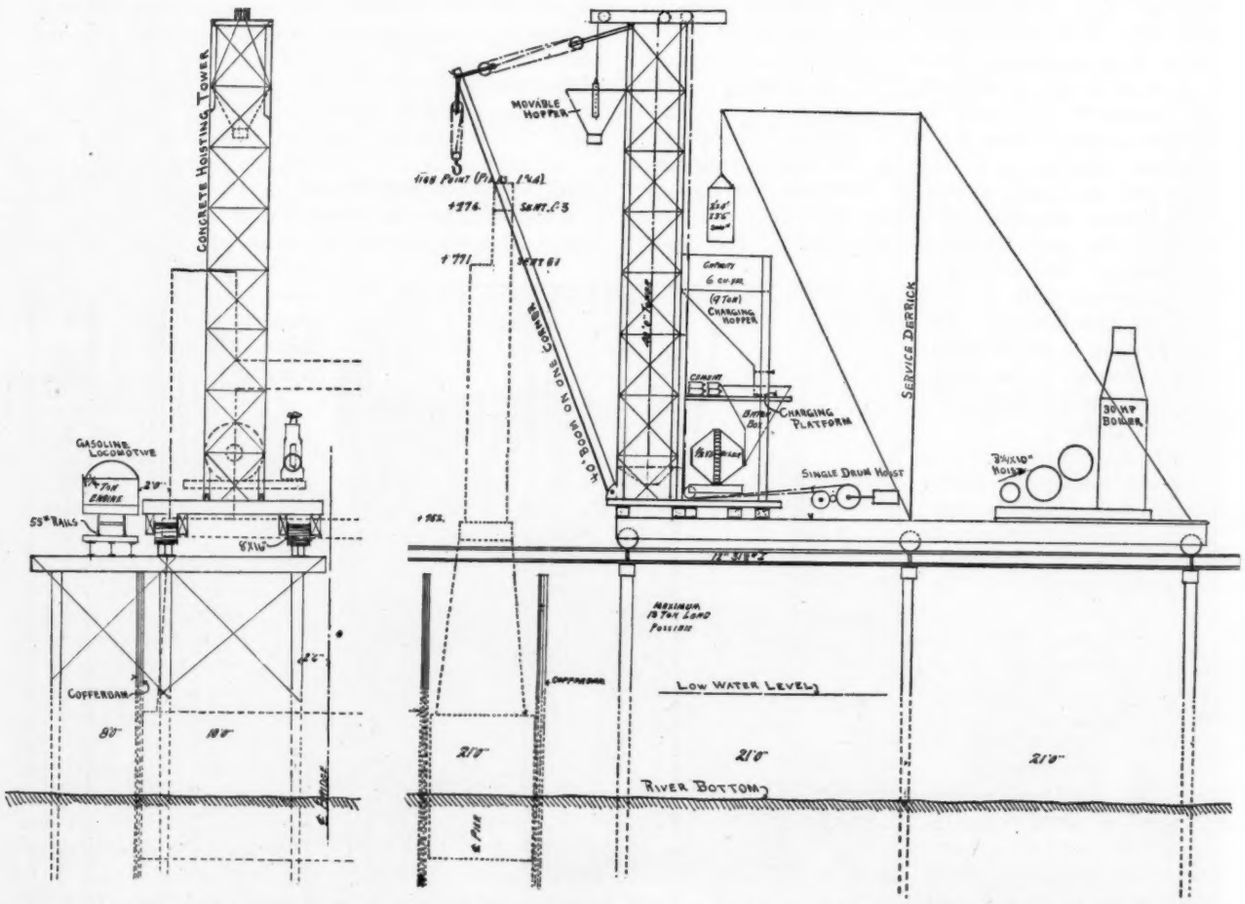
CONCRETE PLANT.

The concrete plant was installed on a platform about 44 feet long and 14 feet wide mounted on six 16-inch double-flange drum wheels or rollers on the 10-foot gage service track. On the extreme forward end of the platform there was installed the wooden hoisting tower 40 feet high, and in the rear of it a 3½-yard concrete mixer set underneath the hopper-bottom storage bin, which was filled with aggregate by a stiff-leg derrick mounted in the center of the platform, and operated by a double-drum hoisting engine, which, with its 30-h.p. vertical boiler, was installed at the rear end of the platform and served as a counterweight for the hoisting tower and its 40-foot boom, which hauled the concrete bucket and the concrete forms and served for general purposes.

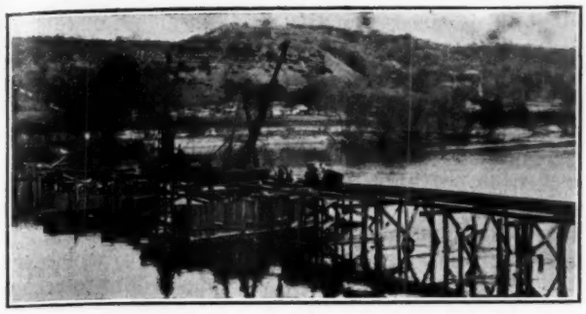
Lumber and cement were delivered on the narrow-gage track to the forward end of the platform and the cement was stored on a charging plaform over the mixing machine, which was supplied with a fixed hopper-bottom batch box charged by gravity from the 9-ton storage bin above. The mixed concrete was delivered to a bucket in the tower that was hoisted by a line from a 5x5-inch single-drum hoist. The concrete was discharged from the hoisting bucket to a moveable hopper suspended from an overhanging end of the tower cap and thence spouted through steel chutes for a maximum distance of 65 feet, or delivered to the bucket handled by the boom which swung it to position and dumped it into the pier forms. This equipment proved very satisfactory and the substructure work was carried on with it and an average force of 60 men.

STEEL ERECTION.

The steel was delivered on the tracks of the



CONCRETE PLANT, WITH HOISTING TOWER, HOPPERS AND DERRICK BOOMS, FOR HANDLING AGGREGATE, CONCRETE AND FORMS, ALL TRAVELING ON FALSEWORK CARRYING SERVICE TRACK ALONGSIDE.



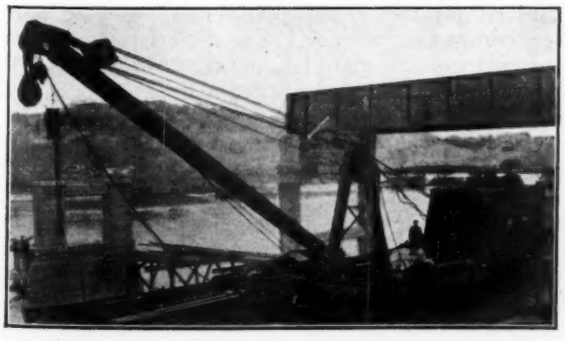
TRAVELING DERRICK WORKING AT COFFERDAM.

Chicago, Milwaukee and St. Paul railroad, which passed under Span No. 1 with a clearance of 22 feet. It was unloaded by a derrick car of 40 tons capacity which delivered to the traveler that erected it. The heaviest pieces handled were the main girders, 79 feet long weighing 10 tons each. The 79-foot spans were erected at the rate of four per week by a gang of 14 men and the rivets were driven at the rate of 360 per four-man gang per eight hour shift.

The principal quantities involved were 498 tons of structural steel, 94 tons of reinforcement steel, 1,764 yards of concrete in the substructure and 517 yards in the superstructure, 341 foundation piles and 1,000 yards of rip rap.

Lower Road Construction Bids

Early bids for construction of Federal aid roads indicate that prices during the coming season will be materially lower than last season. Grading has been bid at 20, 23½ and 30c per cubic yard in Missouri, Arkansas and Minnesota respectively, as compared with an average of 35c for this section last year. Prices for reinforcing steel range around 6c as compared with 8 or 9c last year. A few bids for the best grade of concrete of about $17.00 per cubic yard have been received in sections where the 1921 price was about $25.00 per cubic yard. Prices bid for the construction of concrete roads per square yard are as follows: Oklahoma, $1.52; Colorado, $2.27; Georgia, $1.38, as compared with an average of $2.57 during the period 1916-1920.



DERRICK CAR DELIVERING STRUCTURAL STEEL FROM LOW-LEVEL RAILROAD TRACK TO BRIDGE GRADE

Building Zone Plan Growing Stronger

By Edward M. Bassett

The Greater New York building zone law has now been in operating over 5 years. The protective requirements are shown on 3 maps, known as height, area and use. The charter provides that changes in the maps can be made only be the Board of Estimate. The aggregate changes are extremely small in area, showing the remarkable permanence of the protection of the zoning system.

In the years 1916-1921, inclusive, 158 applications for changes were granted by the Board of Estimate and 134 were denied. These figures tend to show that changes are not easily obtained. This is as it should be, because when an owner builds according to the zoning requirements he ought to be protected against easy changes of surrounding requirements.

Of the total changes there were 4 in 1916, 43 in 1917, 26 in 1918, 20 in 1919, 27 in 1920 and 38 in 1921. It would appear from the figures that during the last 3 years the map changes were fairly proportioned to the normal growth and change of the city.

Use map changes were 143, area map 11, and heights map 4. It is quite possible that as the amount of new construction increases, more changes proportionally will be made in the area and height maps.

Figures show not only official support of the zoning plan, but they show clearly that property owners are gradually favoring the strengthening of the zoning requirements rather than their relaxation.

The building zone system of New York may be deemed a success. Other cities, which have recently adopted it or are preparing their maps, may well be encouraged by the experience of New York.

Rapid Construction of Concrete Bridge

On October 14th, a heavy rain storm caused a wash-out of a wooden bridge over a creek in Ohio county, W. Va. This bridge was on an important road between a prosperous farming community and the city of Wheeling and the immediate resumption of traffic was necessary. The following day, October 15, the board of commissioners ordered the bridge rebuilt of concrete as rapidly as possible and A. C. Hoffmann, the county road engineer, was given instructions to proceed with the work and he placed Campbell Savage in charge as foreman.

Arrangements were made for immediate delivery of sand and gravel and on October 16th, the wreck of the old structure was removed and forms built for one abutment and its wings. The following day concrete was placed in this abutment, resting on bed rock. The next day, the third of construction, the second form was built, and it was concreted on the fourth day. The fifth day, the slab form was erected and on the sixth day the steel reinforcement was placed and the slab concreted on the seventh day. Forms for the railings were built on the eighth day and the railings concreted on the ninth day. On the tenth day, the concrete surfaces were rubbed down and the forms and material removed from the site, leaving the work completed.

This was a 26-foot span bridge with a 30-degree

skew. The state highway department's standard plans were used. The slab is 22 inches thick, reinforced with four 12 by 3-inch steel eye-beams and two 12 by 3-inch channels taken from the old bridge. The working crew ranged from 2 to 11 men.

The Highway Contractors' Problems*

To secure less risk, better engineering and relations with engineers, fairer specifications, improved labor conditions, and others.

Perhaps the greatest problem of constructors relates to the education of themselves. This education should be conducted along the lines of cultivating skill, integrity and responsibility and eliminating the old time jealousy and distrust through encouragement of a spirit of co-operation and mutual helpfulness in every member of the industry.

It is good business for constructors to educate their competitors; it is good business for them to discuss each others problems, construction and administrative methods; it is good business to get each other's viewpoint, it is good business and elimination waste both to the contractor and others, to seek out the best means consistent with first class work and to assist in standardization of methods and equipment along those lines; it is good business to secure added protection by all legitimate means. Organized construction can best promote these things. Sane, honest and common sense competition is better for all interested in highways than the destructive, individualistic tendency which has so often, in the past, made highway construction a financial shambles and brought upon it disrepute as a business proposition.

Lower contract prices are imperatively needed to secure greater mileage of roads for the public. The greatest reduction which can be brought about would doubtless result if certain risks now assumed by the contractor were assumed by the State. A constructor can figure closely on work in direct proportion as elements of risk and uncertainty are eliminated. In many States the assumption of these elements of risk and uncertainty are required by the organic law and can only be escaped by access to public opinion as expressed through legislative action. To bring about a change in these laws which will facilitate a more balanced and equitable form of contract, through the elimination of the above elements, is the problem not only of the constructor but of engineers and all others interested in highway building, who desire decreased costs and better stabilization of the industry.

It is also the problem of the highway builder to use his influence to create a public sentiment which will countenance better paid and better qualified engineers and inspectors. Good constructors invariably find engineers and inspectors satisfactory in direct proportion as the latter possess integrity, intelligence and experience and that the employment of high class men will invariably justify itself in an ultimate saving to the taxpayers.

Another problem of the constructor is to cooperate in pointing out to the highway departments and engineers those requirements of the specifications which entail increased costs without any commensurate advantage and those requirements which can be waived in the interests of economy without sacrificing quality. The difficulty with commissions and engineers (as to many changes for which we are asking) lies not so much in their failure to recognize the just principle to apply as in finding a means to apply it practically.

One of our problems is to bring about a realization, by all engineers and inspectors, that the constructor is their partner and not their bondman in a great work.

In the matter of specifications, we believe it to be one of our problems to secure the settlement, by an impartial referee (when desired by either party) of disputes between ourselves and engineers as to the interpretation of specifications and matters of equity. Said William B. King, of the Washington bar:

"The engineer writes what, in his judgment, has a certain meaning. The easy evolution of authority to the architect or engineer to decide all uncertainties, directly encourages vagueness in writing specifications." An engineer, with every desire to be fair, will oftentimes interpret specifications too much in the light of what he had in mind to safeguard when he wrote or adopted the specification in dispute. The working out of standard specifications for the country as a whole will save much effort and expense for which the taxpayers now pay.

Uniform and fair treatment of labor and possibly more uniform wages and working conditions for the various classes of skilled labor employed upon highways are believed to be a problem from which benefit can be derived. If it were possible to develop some co-ordinated industry in the northern and border states, whereby highway labor might be retained the year around upon some productive work, constructors would be able to secure greater economy and added efficiency from their organizations. Co-operation between concerns working in the same locality, in the matter of labor, will go far towards stabilizing conditions and creating greater efficiency.

One problem relates to the working out of a form of contract with material producers which will be a standard for the industry and more binding upon both contracting parties. The experience of many constructors with material contracts, during the war and post-war period, had a direct tendency to increase contract prices.

Another problem is the matter of responsibility for rejected material. Some producers refuse to accept responsibility for material condemned after unloading, while some engineers refuse to make final inspection until the material is unloaded. Uniformity of practice and understanding in this matter will remove an element of anxiety and loss to many constructors and will, doubtless, reflect itself in lower contract prices.

In the matter of transportation, our chief problem is to assist the railroads, and indirectly the public, in

*Excerpts from paper by Henry H. Wilson before the Good Roads Congress.

the elimination of waste and expense, by so designing work and unloading facilities as to provide for prompt release of cars.

Standardization of equipment holds great possibilities for efficiency and economy and organized construction is already moving in this direction.

One of our greatest problems lies in our relations with the surety companies. It is believed that a reduction in the cost of highway construction can be effected through a reduction by the surety companies of the premium now charged for contract bonds; and it is believed this reduction will be justified by a more careful investigation upon the part of the Surety Companies, of contractors whom they bond. Within the past ten years there has been an increase of approximately 100 per cent. in bond premium and, within the past thirty years, the increase has been comparatively greater.

Jefferson County's Road System*

By E. M. Wheeler

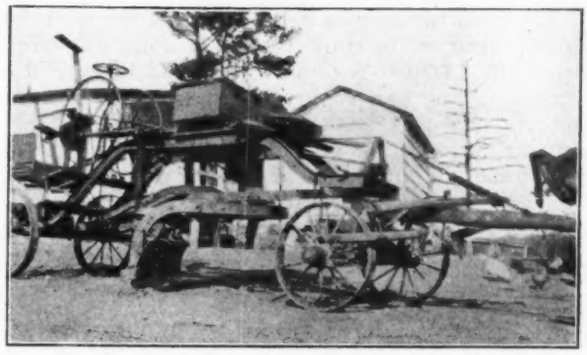
Equipment used for road work, cost and efficiency of convict labor, and cost of truck operation and maintenance.

The total equipment available for road work consists of 10 tractors and 28 motor trucks, in addition to scrapers and graders. With one exception the trucks are all 3½ ton, this size having been found best suited to the work to be done. The tractors range from the Fordson up to larger machines, and include the Avery, Twin-City, Hart-Parr, and Rumeley. Several makes of trucks are used, including the White, Federal, Mack, Government, and Standard. Five new Government trucks are about to be added to the equipment.

One of the most efficient machines is an Avery one-man road machine, equipped with a 12-foot blade. This machine will scrape 12 miles of road in one day, at a cost of 10 gallons of gasoline, 2 quarts of oil, and the time of one man.

*Concluded from page 300.

MOTOR TRUCK AT CAMP NO. 1.



MULE-DRAWN ROAD SCRAPER, CAMP NO. 1.

Maintenance is mainly eternal vigilance in small things. The roads are watched very closely and not allowed to get in too bad shape before corrective measures are applied. Such measures differ with the condition of the roads. When not too badly worn, the road is scraped and reshaped by machine. When the road is worn so that this is not possible, the holes are filled with new material, and the surface scraped and reshaped. Where a highway is obviously beyond such methods, it is scarified, three or four inches of new material added, and the road entirely remade. This is necessary about once in two years.

The cost of convict and free labor necessary to do the work is about $233,000 a year. A part of this would be spent under any circumstances in maintenance of the prisoners, and their food and clothing costs would remain about the same, whether working or idle. The roads of Jefferson county represent an expenditure of about $6,000,000, so that the money spent for maintenance is a comparatively small sum. And yet, by the spending of this sum, the citizens of the county are enabled to enjoy the benefits of a real system of good roads.

The efficiency of convict labor in comparison with free labor has been the subject of much discussion. Until the first of 1922, Jefferson county maintained free labor camps in addition to the convict camps, so that a direct comparison is possible. During 1921, free labor was paid $2.50 per day for road work, and required to maintain themselves. Usually the foreman maintained a camp and commissary, charging the men for the board and sleeping quarters. The cost to the county per day of work was $2.50.

Convicts work only in good weather, but they must be fed, guarded, and maintained at all times. The cost of convicts during 1921, in six camps in the county, varied from $1.65 to $2.35 per effective day of work, averaging, for all camps, $1.98 per effective day. The work days, by the way, were 66 per cent. of the feed days, showing a fairly good working efficiency, which is much higher than can be maintained with free labor.

It is the opinion of the department that convict labor, when properly worked, with good foremen, has as much value as free labor. Whatever advantages free labor may have in "will to work" is overcome by the uncertainty of securing enough labor. "Laying off" works havoc with the efficiency of any construction job. There is no such trouble with convict labor. The convicts are not paid except for Sunday work around the camp.

The costs for various items in connection with the maintenance of the convicts at the camps are given herewith. Items for the individual camps are omitted, owing to a slight difference in the accounting methods used by the various foremen, and only general averages are given. It may be stated, that with the going into effect of various economies with the beginning of the year, it is expected that the costs for 1922 will be materially lower than those for 1921, the costs for which follow:

Cost of Maintaining Convict Camps, 1921.

Groceries	$31,922.35
Clothing	13,811.89
Camp maintenance	21,381.54
Guard pay roll	30,698.15
General expense	27,278.25
Total	125,092.18
Groceries for free labor	4,991.46
Convict maintenance	$120,100.72
Convict work days	60,535
Convict idle and yard days	31,796
Guard days	11,776
Free labor feed days	18,599
Total feed days	122,706
	Cents
Cost per day for food	.26
Cost per convict work day, total	$1.98
Cost of convict clothing per month	4.48
Cost of convict camping per month	6.95
Cost of guarding convicts per month	10.96

It may be of interest to note that the mules in the various camps cost 53 cents a day for food and that they worked 79 per cent. of the time, so that the cost per effective day of work was about 65 cents.

The total cost of maintaining the prisoners and of operating the road equipment was $233,091.61. Two hundred prisoners were on hand the first of 1921, and 286 at the end of the year.

It is not possible to get work from prisoners unless they are, to some degree at least, satisfied with their living conditions. Every effort is made to keep the camps in first class sanitary condition, and to make them fairly comfortable. Good, wholesome food is served in clean dining rooms. The kitchens have to pass the inspection and receive the approval of the county board of health. Vermin are kept out of the camps by strict compliance with sanitary rules, and by frequent fumigating. Prisoners are not chained in the cell, which is a large, long, one or two-room building, wide enough to contain a double row of beds, end to end, with a passage-way in the middle. Double beds are used. Airing and cleaning of the bed clothes are required at regular intervals. Shower baths are provided and the prisoners required to bathe at regular intervals. White and colored prisoners are kept in different camps.

A new system of accounting was installed the first of the present year, by means of which more accurate costs on certain phases of the work will be available. Some time has been necessary to educate the foremen of the various camps in the new requirements, but accurate costs are now becoming available. The accompanying table shows the cost for repairs, oil, gas, drivers, per ton, and per mile, for February.

Plans for the future include the possible formation of a grading gang, made up from present equipment. Mules are not economical on road maintenance work as compared with tractors. Four small tractors at less than $3,000 total cost will take care of the same amount of work as mules worth $7,000. With the acquisition of these four tractors these mules could be used efficiently on grading work, and it is believed that such work could be done by county forces at a considerable saving in cost over present prices.

The road work in Jefferson county is directly under the Board of Revenue, of which D. C. Ball is chairman, and W. B. Copeland, Lacey Edmundson, Jerry Gwin, and Thos. E. Huey are members. Claude J. Rogers is county highway engineer, and the writer is superintendent.

Jefferson County Truck Report for the Month of February, 1922.

Trucks.	Gas. Oil and	Reprs.	Driver.	Total.	No. da. Worked.	No. Mi.	Mi. Oil and Gas.	Tons.	Cost Mi. T.	
5½-ton	89.87	61.55	52.50	203.92	15	637	.14	1220	.17	Camp 2
3½-ton	55.13	436.04	38.50	529.66	11	622	.09	985	.54	Camp 5
3½ ton	91.81	18.75	77.00	187.56	22	1279	.07	2276	.08	Camp 4
3½-ton	78.08	245.86	52.50	376.44	15	974	.08	1782	.21	Camp 4
2-ton	55.79	40.26	56.00	152.05	16	682	.08	752	.20	Camp 6
2-ton	52.91	104.51	70.00	227.42	20	549	.10	873	.44	Camp 2
2-ton	54.93	2.38	73.50	130.81	18	873	.06	878	.15	Camp 1
3½-ton	70.03	54.29	56.50	190.82	19	942	.07	1683	.12	Camp 4
3½-ton	65.20	130.50	42.00	237.70	12	616	.11	1000	.24	Camp 2
3½-ton	52.29	179.77	38.50	270.56	11	496	.11	915	.29	Camp 4
3½ ton	159.48	77.83	63.00	300.31	18	621	.26	807	.37	Camp 7
3½-ton	81.90	90.20	59.50	231.60	17	930	.09	1722	.14	Camp 4
3½-ton	79.47	1.61	73.50	154.58	21	858	.09	1473	.11	Camp 2
3½-ton	72.16	86.91	73.50	232.57	21	1467	.05	2327	.10	Camp 5
3½-ton	74.60	13.30	73.50	161.40	21	1139	.07	1617	.10	Camp 5
3½-ton	50.13	243.58	42.00	325.71	12	527	.09	677	.49	Camp 3
3½-ton	40.38	165.87	52.50	258.75	15	483	.08	553	.47	Camp 3
3½-ton	75.70	313.76	66.50	456.06	19	1146	.07	1995	.23	Camp 5
3½-ton	57.60	118.32	70.00	245.92	20	722	.08	1055	.23	Camp 3
3½-ton	100.85	184.81	70.00	355.66	20	1019	.10	1816	.20	Camp 2
3½-ton	78.28	135.71	70.00	283.99	20	1291	.06	2141	.13	Camp 5
3½ ton	77.63	39.45	70.00	187.08	20	1034	.08	1499	.12	Camp 1
3½-ton	60.52	57.98	63.00	181.50	18	796	.08	1269	.14	Camp 2
3½-ton	89.56	67.85	70.00	227.41	20	981	.09	1625	.14	Camp 2
3½-ton	81.67	42.92	66.50	191.09	19	1149	.07	1886	.10	Camp 1
	1,846.07	2.914.00	1,550.50	6,310.57		21,833	.08	3,4516	.18	

PUBLIC WORKS

Published Weekly
at 243 W. 39th St., New York, N. Y.

S. W. HUME, President J. T. MORRIS, Treasurer

Subscription Rates
United States and Possessions, Mexico and Cuba $3.00 year
All other countries..... 4.00 year
Change of Address
Subscribers are requested to notify us promptly of change of address, giving both old and new addresses.

Telephone (New York): Bryant 9591
Western Office: Monadnock Block, Chicago
A. PRESCOTT FOLWELL, Editor
FRANK W. SKINNER, Associate Editor

CONTENTS

Plans for Sewerage and Water Works

Most large engineering offices have found it desirable to standardize many of the features of the plans and maps prepared by them. The adoption of two or three standard sizes of sheets greatly facilitates filing; the placing of title, scale and explanation of symbols at the same relative position on each sheet expedites finding the one desired; the standardizing of symbols minimizes the probability of error in using and interpreting them; and there are a number of other features the standardizing of which will aid greatly in the efficiency and economy of the work of the office.

In connection with any special branch of engineering it is conceivable and even probable that there are standards for the various features that are best adapted to plans relating thereto and that should, therefore, be adopted by all engineers; such as scale of map, scale of detail plans, and symbols. To a certain extent this has been done; topographic symbols, for example, are pretty well standardized.

Such general uniformity is especially convenient for those who have to deal with the plans of a number of engineers, among which are state boards of health and of public service. Both of these state boards can require, in most states, the filing of plans of sewerage systems and of water works, and there would, therefore, seem to be considerable justification for their requiring engineers doing work in their respective states to conform to standards such as have been referred to. In fixing such standards, however, the board should adopt those in most common use so as to necessitate the minimum of change in the previous practice of the engineers.

Such conformity to standards is required, or in some cases only suggested, by a number of the states, two of which are referred to in this issue. On the other hand, a number, perhaps the majority, do not specify the size or form of plans and maps but only require that they furnish the necessary information.

In the matter of information furnished there is also a difference in practice. Most of the states specify in general the kind of information required, but others go much further and specify in great detail the several headings and sub-headings to be used in the engineer's report as well as the matters to be shown on the maps, plans and sections. An illustration of the latter is Arkansas, an abstract of whose regulations on this point is given in this issue. These regulations name twenty-two classes of information that "shall" be given by reports on sewerage systems. The California board names twenty-nine headings for a report on sewerage, but states that "Its scope is indicated by the following suggested headings, but it must include a discussion of other important considerations, whether listed here or not. These headings are suggestive only."

It seems to us that a health board should not go further than to *suggest* the exact form in which a report is to be drawn up. We would prefer even that these suggestions be not contained in the body of the regulations, since the fact that they are only suggestions might be overlooked; but they might better be printed on a separate folder.

Certainly engineers who have had years of experience in preparing plans and writing reports of this kind do not need such suggestions, and should not be asked to suppress their initiative and follow a stereotyped form which might lead to failure to assign a proper perspective to the several major and minor elements of the problem. But, on the other hand, engineers young in this work would undoubtedly be glad of such aids, and be less likely to overlook important questions that should have an influence on the design.

Wages and Public Works

Apparently wages are now down about to the level of the latter part of 1917, and are still falling slowly, so that the average for this year will probably be about that for 1917, or 40 per cent. higher than 1914. In the eastern States, outside the large cities, plenty of labor can be had for 25 cents per hour or less—even below 20 cents in Philadelphia; while in the southern States 13 to 15 cents was being paid a few weeks ago. On the Pacific coast, where labor has always received the highest wage, 45 to 50 cents was common quite recently.

Carpenters' wages and those of other mechanics

have not fallen so much as those of common labor in the sections of cheap labor, such as the south Atlantic States, but have reached 40 to 60 cents in most States east of the Rocky Mountains.

Altogether, since there have been considerable reductions in labor and cement and prices for many other materials are reasonable, the indications are that public work can be done this year at a price that will stimulate such activity as has not been seen since the war.

Water Power Licenses

The Southern California Edison Company has been granted by the Federal Power Commission a license to develop an important project on the San Joaquin river. It is planned to install machinery capable of developing 195,000 horsepower. A dam 100 feet high is to be erected. The power will be fed into the company's transmission line which supplies power to Los Angeles. Another license was granted the Portland Railway Light and Power Company of Portland, Oregon. This covers important developments in Clackamas County, Oregon.

Cleaning Canals and Laterals With a Disk Harrow

A recent number of Reclamation Record contains an account of the method pursued by water master Geo. Haycock for cleaning moss and weeds from the canals and laterals of the Minidoka Irrigation Project, Idaho, by means of a disk harrow.

The banks and bottom are sometimes covered with a heavy blanket of moss and with long, slender weeds that sometimes obstruct the channel so much as to cause the water to overflow the banks and to do considerable damage besides reducing the flow. Various methods have been tried for the removal of the growth and the use of a submarine saw and men wading in the shallow water and cutting with scythes were the most satisfactory, but were slow and expensive.

The use of an ordinary farm disk harrow was found ineffective, but when the harrow was modified by the use of a special semi-circular frame connecting the disk to the drawbar and permitting the machine to be swung transversely at the several different angles, very satisfactory results were obtained. The machine was hauled by two wire cables, each operated by a team, one team on each bank of the canal.

The main canal 20 to 25 feet wide and the laterals 8 to 10 feet wide at water line, were cleaned by a machine and a crew consisting of foreman, two teamsters, two teams and one laborer. This outfit averaged one mile per day of canal and 1¾ miles of laterals, at a direct cost of $18.50 per day exclusive of overhead. The average cost per mile for canals and laterals was from $15 to $17 while the same work done by hand cost $82.50 per mile.

About 17 miles of canal were cleaned with very satisfactory results, and after the water was drawn off an inspection showed that the canal was in excellent shape for next season's work without further cleaning. It was estimated that without this operation it would have been necessary to move about 10,000 cubic yards of silt from the cleaned portion of the canal, which was thus handled at a cost of about 3¼ cents per cubic yard. The principal objection to this method of cleaning is that it causes weir and orifice holes to fill up; but as these have to be cleaned occasionally in any event, it is not a serious matter as compared to the cost of silt removal.

Comments on Imhoff Tanks

Madison, Wis.

Editor of Public Works:

Dear Sir: In accordance with your request I am herewith submitting my views and observations on the Imhoff Tank, after reading the excellent article by Mr. Riker, and the discussions which followed. I can add but little to what has been said in Public Works by these men or to what I have published in other periodicals.

One tendency, which I think we all have, is to write what we think, what we assume happens in a tank or that which we would like to have happen, rather than what actually does happen. These ideals seldom, if ever, come true.

After reading these papers and others along the same lines, together with my experience with Imhoff tanks, I offer the following as a brief summary of principal facts and ideas affecting the operation of the Imhoff tank.

Imhoff Tank Operation

1. Age of sewage—relatively stale better than fresh sewage for Imhoff tanks.
2. Grease and oils—American sewage more than German causes scum on upper chambers and sludge in gas vent.
3. Viscosity of sludge holds down gas and is factor in foaming.
4. In large plants, tanks nearest inlet receive less sewage and grease, but more heavy sediment and are less liable to foaming, but scum will be more pronounced.
5. Too small gas vents or large ones restricted by scum, increase tendency to foaming.
6. Liberation of gas by frequent drawing of sludge or stirring tends to prevent foaming and scum.
7. If fresh material is brought into contact with stale, bacterial reduction will be greater and sludge reduction more pronounced.
8. Aeration of sludge by air lift pumps is beneficial.
9. Imhoff tanks on effluent of sprinkling filters do not foam.
10. Manner of making slot and position of the baffle or "V" affects amount of scum on upper chamber.
11. Slopes of hoppers have not been sufficiently steep or smooth enough. The minimum should be 1 to 1.3.
12. No concrete or other permanent covers should be placed over Imhoff or similar tanks. Where possible, housing is preferable.
13. Most troubles are due to design, mismanagement and gross overloading.
14. Advantage of Imhoff tank is its automatic separation of liquid and solids. This separating can be done mechanically at additional cost, but with the assurance that some troubles will be eliminated.

Remedies for Existing Plants

Put in mechanical stirer in sludge digestion chamber or circulate sludge from tank operating correctly into foaming one. Draw off small quantities of sludge frequently rather than large ones at long intervals.

From Mr. Coulter's discussions one might conclude that it would be a desirable thing to "Blow off" the digestion chamber above the sludge level as soon as indications of foaming are noticeable. This could be readily accomplished in divers manners.

New Plants, if Tanks Must Be Used

Use plain sedimentation tank with steep hopper bottoms, provide means to draw off sludge constantly as by air lift pumps or frequently by other means so as to keep primary tanks in fresh condition. Digest sludge in separate tank or dewater by mechanical means.

Yours truly,
W. G. Kirchoffer, San. & Hyd. Engr.

Gilboa Dam Construction*

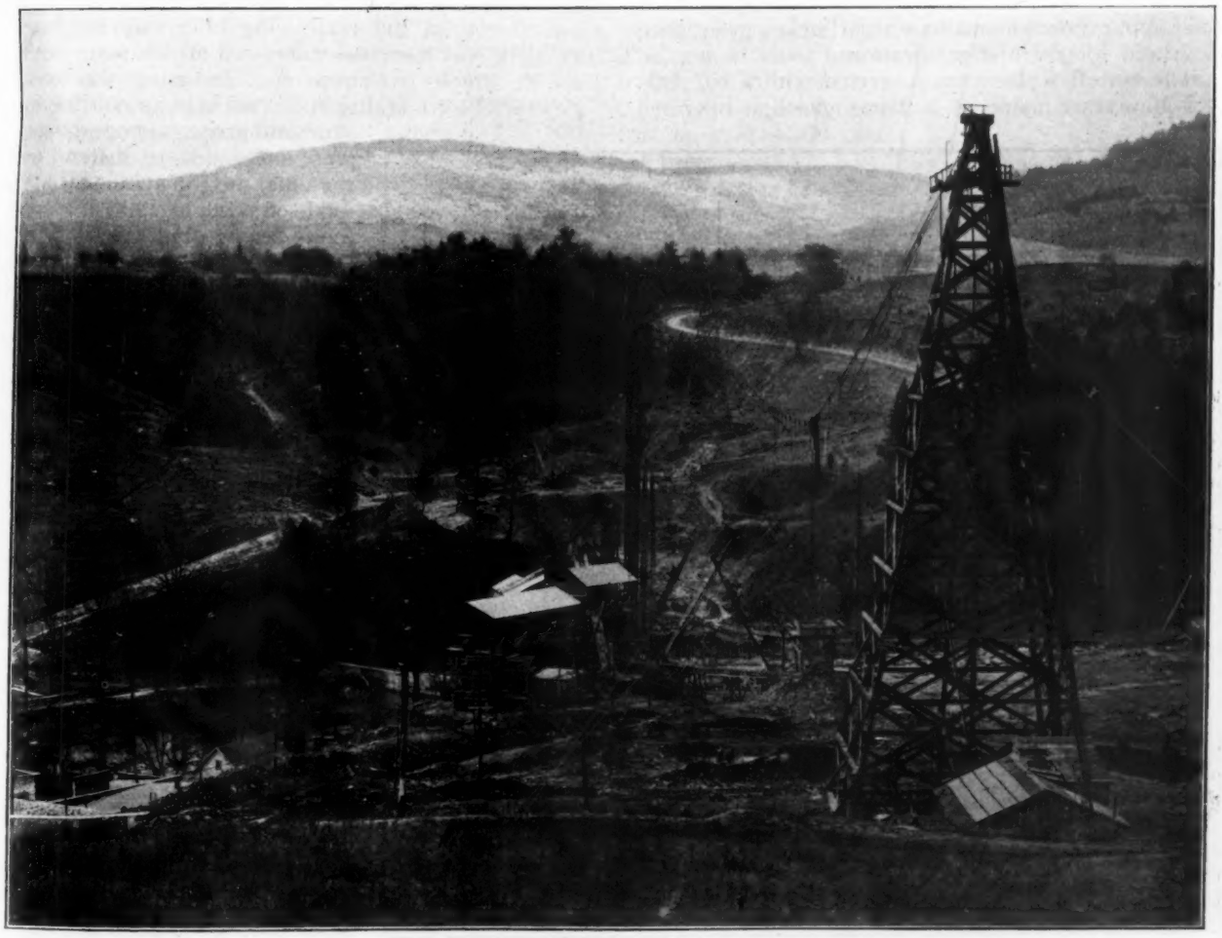
Steenkill dike and appurtenances. Foundation, excavation, controll channel, steam shovel and belt conveyor work for large embankment, bypass pipes and flume, repairing culvert and paving slope.

The west end of the 2,300-foot long masonry structure of the Gilboa dam across Schoharie creek is extended about 730 feet by a short transition section and a little more than 600 feet of an earthen dike, curved in plan, which is 34 feet wide at the top and about 445 feet in maximum width at the bottom, with a concrete core wall which is carried down to offset foundations on the rock bottom and crosses the former Steenkill channel. The top of the dike will be about 20 feet above the flow line of the reservoir, and about 150 feet above the lowest part of the original surface of the valley. The construction involves a foundation excavation of about 40 feet in maximum depth. The embankment contains about 600,000 cubic yards of earth.

*Part I—Exploration borings, pressure tests, river diversion, foundation excavation and installation of plant was published March 25th.
Part II—Quarries, sand pits, washings and screenings, concrete mixing and placing was published April 29th.

The Steenkill water was temporarily bypassed through the lower part of the Steenkill dike by a concrete culvert until the core wall and embankment had been carried up to a height of about 30 feet, permitting the water to be diverted through a control channel across a tongue of land to the bed of the Schoharie creek above the main dam; after which earth and sand were sluiced into the culvert through pipes left for the purpose in the roof, solidly filling the culvert, which was then imbedded in the embankment which, as it was carried higher, extended a considerable distance beyond both ends of the culvert.

Subsequently the water of the Steenkill was passed through the cofferdam in the steel bypass pipes until the masonry reached a sufficient elevation to permit the pipes to be sealed and the water to be diverted through a tunnel left in the masonry, to be eventually closed after the dam is completed and the



GENERAL VIEW OF DAM SITE, SHOWING MAIN CABLEWAY, SAND PLANT AND CONCRETE INSTALLATION DESCRIBED IN PART II.

engineers are ready to impound the waters and fill the reservoir.

Work on the excavation of the Steenkill control channel was commenced in the spring of 1921 with a pick and shovel gang, supplemented by a drag scraper operated by a hoisting engine to move the material back from the channel.

The invert of the channel, 10 feet wide, was widened to 20 feet at the approach and outlet and was protected with 18 inches of broken stone pavement extended over the 1:2 side slope. The channel was about 300 feet long with a grade of approximately 20 per cent., and was provided with four cut-off walls, one at the top, one at the bottom, and two at intermediate points of the slope.

Paving stone and concrete stone from the main dam excavation were delivered by wagons or loaded in skips or buckets handled by a derrick and relayed by it to a stiffleg derrick on top of a knoll that dumped them into 1-yard side-dump cars operated by a hoisting engine over a 2-foot gage track extending from top to bottom of the control channel.

The paving closely followed the excavation and as soon as 40 feet of the invert had been paved, the side slopes were started and the paving was flushed with 1:3 grout mixed in a 1-bag machine discharging into a mortar box, from which it was dipped by pails and poured in place by hand. The work was carried on rapidly enough so that little separation of the cement and water in the grout resulted, and the final application was made with a thicker grout than was used for the first application.

The cut-off walls were concreted with a 1:2 1-3:4 2-3 mixture made in a 1-bag gasoline operated machine delivering to a chute through which the concrete was spouted to place.

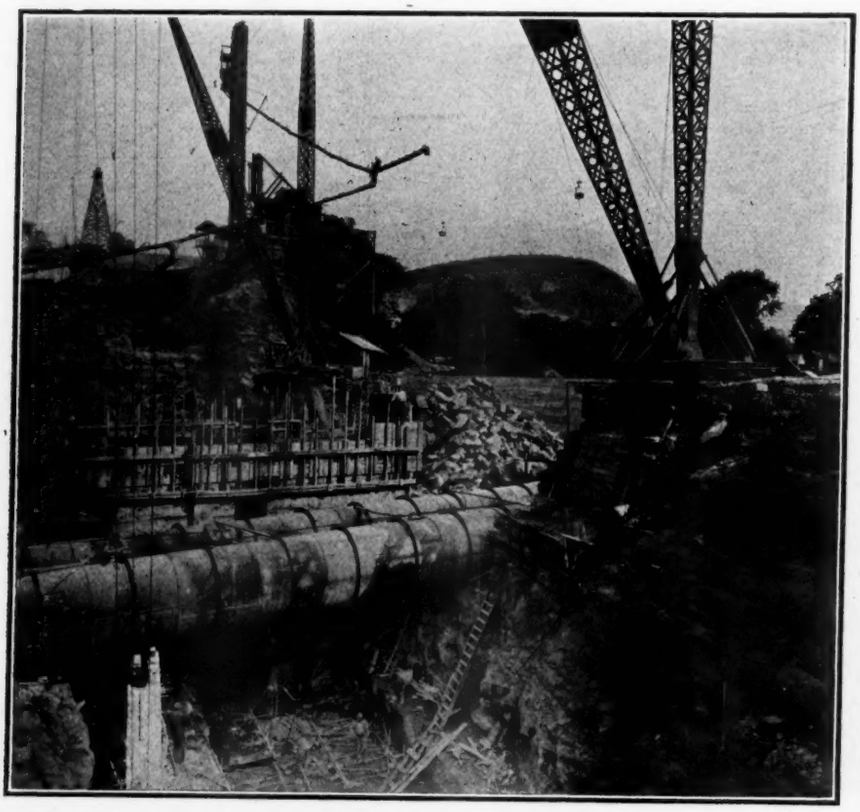
EMBANKMENT CONSTRUCTION.

The construction of the dike embankment was commenced by placing a small amount of suitable material provided by the excavation for its foundations, but was mainly carried on with very lumpy red and yellow clay excavated by an Atlantic No. 45 steam shovel from the top of an adjacent hill; loaded at the borrow pit into trains of two 4-yard cars hauled by a dinky locomotive to a dumping hopper which discharged onto a 600-foot belt conveyor which delivered the clay at the lower end to a loading hopper near the concrete bypass culvert. Wagons drawn by teams passed under the hopper, were loaded, and transported the clay to required position on the embankment, where it was dumped and spread by horse-drawn grading machines, finished by hand and compacted in 4-inch layers by a steam roller. As the work progressed the lower end of the belt was raised and moved longitudinally of the embankment until eventually the conveyor was higher than the top of the embankment and the material was chuted to position.

CRACKS AND DISPLACEMENTS.

When the embankment had been made up to a height of about 55 feet above the lowest point of the original surface of the ground, at the east end of the dike, cracks developed, and an investigation showed that the ground under the embankment was slipping transversely on the underlying blue clay stratum. The bank was therefore narrowed at this point with hope to arrest movement by decreasing the load. The cracks were sealed at the surface by pouring in sand and grout, and operations were suspended at this end of the dike, the embankment having been brought up to a maximum height of about 76 feet for a length of 250 feet.

The lower end of the dike was protected by a wooden flume extending to the paved control channel and preventing the accumulation of water pressure against the face of the dam at this point. For a length of 60 feet the flume was 12 feet wide and 8 feet high, beyond which the height of the flume was reduced to 5 feet. The flume was built with 2-inch longitudinal planks covered with tar paper protected by 1-inch boards and spiked to transverse bents 4 feet apart on centers. Each bent having two 6x8-inch vertical posts and an 8x8-inch sill long enough to receive the feet of 2x8-inch outside inclined braces. The tops of the posts were tied together over the flume by 2x8-inch planks. At the upper end of the flume there was built a wing wall or braced wooden bulkhead, extending below the surface, to form a cutoff.



BYPASS PIPES CARRYING FLOW OF STREAM THROUGH COFFER-DAM. DESCRIBED IN PART I.

To support the downstream side of the dike and the unstable stratum below it, additional embankment material was placed to bring the level up above that of the blue clay stratum. To prevent the accumulation of water against the downstream face of the dike the lower end of the culvert was connected to a pair of 24-inch cast iron pipes 250 feet long which were laid in concrete to carry the flow away from the embankment.

Late in the fall of 1921 a freshet produced a greater flow in the culvert than could be carried by the 24-inch pipes and resulted in rupturing 22 feet of the culvert at the outlet end, where gravel and driftwood were brought down by the flood, blocked the end of the pipe, and backed up the water until it flowed over the dike, washing away some of the last placed material, but doing comparatively little damage to the dike.

The upper end of the culvert was closed with stop planks, the gate was shut, and water impounded above the dike while the culvert was drained with a 6-inch electric centrifugal pump and a 6-inch duplex pump, permitting the entrance of a wheelbarrow gang which cleared away the obstructions at the entrance to the cast iron pipes.

A 14½x26-foot area surrounding the broken portion of the culvert roof was enclosed by 2-inch sheeting, and excavations and repairs were made there, the stop planks removed, and the culvert opened and used to draw off the water impounded above the dike.

As the work on the embankment progressed, the force was increased from one to two and finally three shifts, and the belt conveyor was supplemented by a narrow-gauge double-track railroad 250 feet long with a grade of 8½ per cent. and carried for 200 feet over a timber trestle. The tracks extended from the end of the belt conveyor and on them were operated a pair of 4-yard cars connected to opposite ends of a cable carried around a regulating drum at the upper end that determined the speed and permitted the full car descending to pull up the ascending empty car.

PAVING.

In September 1921 the protection of the upstream slope of the dike was commenced by covering it up to elevation 1,050, about 60 feet above the original lowest ground surface, with three feet of rip-rap. Above that elevation there is being laid a pavement of 18 inches of large stones, procured from the dam excavation and delivered by cableway to the west end of the dike, where they are handled to place by a stiff-leg derrick on top of the dike leg. The very large stones are laid on their beds, but the remainder are set on edge and all are covered with 6 inches of crushed stone. Up to the end of 1921 about 1,250 cubic yards of paving had been laid.

The principal items of plant installed for the construction of the Steenkill embankment include one Atlantic type, class 45 steam shovel with 2½-yard buckets at the borrow pit; one 12-ton Austin roller; one 15-ton dinky locomotive at the borrow pit; two 30-h.p. vertical boilers; two 2-drum hoisting engines at the channel diversion; one single-drum hoisting engine; 1,100 feet of narrow gauge railroad track; one hand crab derrick at the river diversion; one 22-inch belt conveyor 600 feet long.

Refuse Collection in Paterson

Amounts collected and itemized costs of collecting, hauling and incinerating. Horse-drawn wagons, gasoline trucks and electric tractors used.

As has been the case for several years past, H. J. Harder, city engineer of Paterson, N. J., kept during 1921 quite complete records relating to the collection and disposal of ashes and garbage in that city—a practice which is far too uncommon in American cities.

The amounts of refuse collected per month varied from a minimum of 2580 in February to a maximum of 5500 in June, the total for the year being 57,381. The average number of electric tractors per day in use varied from 2.8 in February to 4 during seven months of spring, summer and fall. The average number of loads collected by them per day was 5 every month except 5.1 in February, 5.3 in March, 5.4 in April and September and 5.1 in October. The tractors had a capacity of 10 tons and the average amount collected varied from a maximum monthly average of 10.57 tons to a minimum of 9.57. The cost of labor employed in collecting by electric tractor varied from a minimum of 37.49 cents per cubic yard to a maximum of 48.25 cents, averaging for the year 41.08 cents.

The current used by the tractors cost $1,176.28 for the year or 2 cents per cubic yard. Maintenance of the trucks cost $3,726 or 6.49 cents per cubic yard. The overhead was $6,000, making the total cost $34,483 or 60 cents per cubic yard. The maintenance cost for February was more than 25 per cent. of that for the entire year and the total cost for that month averaged 91¼ cents, the highest average cost per month for the remaining 11 months being 55.35 cents.

Part of the collection was made with horse-drawn wagons, the teams being hired. February, the month during which the least number of electric tractors were used and the highest amount of repair charges were incurred, was also the month during which the greatest number of horse-drawn wagons were in service. During this month the average number of wagons in service was 22.66, while during the summer months only 7 or 8 wagons were in use. The horse-drawn wagons averaged from 5.4 loads per day in July to 8.46 loads in January, the amount carried by each load averaging slightly more than 3 cubic yards. The number of men per wagon averaged slightly less than 2, apparently from 1 to 3 of the wagons going out with only 1 man. The cost for teams and labor averaged 64.04 cents per cubic yard, which was the total cost, as the teams were hired and there was no cost for maintenance or supplies.

Gasoline trucks also were used of two sizes, 5 cubic yards and 10 cubic yards capacity. Two of these were used in December, January, February

and March and three during the other months of the year. These trucks made 6 trips during June, July, August, September and October, 7 trips during April and May, 7.8 trips in February, 8 trips in November and December, 8.37 in March and 8.50 in January. In general there were 4 men to a truck, although in December, January and March 5 or 6 men were used per truck. The total cost of collection by gasoline trucks was 5.45 cents per cubic yard for labor, 5.9 cents for gasoline, 9.97 cents for maintenance and 78.73 cents per cubic yard including an overhead of $14,000.

The garbage was hauled to a destructor plant and the ashes to dumps. In maintaining the dumps there were employed an average of from 7 men in January to 12½ men in December. The total cost for labor on the dumps averaged 9.4 cents per cubic yard deposited there, the total number of yards deposited on the dumps having been 142,193. Other costs in connection with the dumps averaged 0.96 cents per cubic yard, giving a total cost of 10.36 cents for maintenance of the dumps.

Combining all costs, this gives a total cost for the 176,769 cubic yards removed of $130,828, or 74 cents per cubic yard, this including overhead.

Of the material collected 34,576 cubic yards was incinerated. The cost of operating the incinerator was $12,914 for wages and $3,031 for maintenance, a total cost of maintaining and operating the incinerator of $15,945, or 46.11 cents per cubic yard.

Carting clinker from the destructor plant was quite an item, the cost of this service for the year having been $2,392, of which $284 was for wages, $1,958 for team hire and $150 for maintenance. The material incinerated produced 2,807 cubic yards of clinker and the cost of removing this was therefore 85.21 cents per cubic yard of clinker removed, or 6.9 cents per cubic yard of material incinerated. In this case the clinker, instead of being an asset as it is sometimes claimed it will be in advocating destructor plants, was a liability to the extent of about 7 cents per yard of material incinerated.

LINCOLN HIGHWAY.

Sixty miles of the Lincoln Highway, between Boone and Carroll, has been put in fine shape and smoothly graveled, with the result that the buses operating between these cities, each of which holds twenty passengers, will operate the year around, making three trips each way every day. The service starts with two buses, and it is expected that more will be added rapidly.

The expenditure during 1921 on the Lincoln Highway between New York and San Francisco, which was at first estimated to have been $6,500,000, is now stated to be more than $9,400,000.

The construction of the 30-mile Ridge Route Highway in California cost $1,500,000, and it is conservatively estimated by state authorities that this road effects an actual saving to motor vehicle users of $6,000 daily, so that in the first year the road paid for itself.

Engineers' Plans for State Health Boards

Regulations of the State Boards of Alabama, Arkansas and California with respect to the matter and form of plans and reports required to accompany applications for water and sewerage permits.

Some of the state health boards have adopted detailed instructions to engineers concerning the forms in which plans and other descriptions of proposed water and sewerage works must be submitted to them, while others leave this largely to the engineers themselves. It is impracticable to quote the detailed instructions but an effort is made to give in this and following articles abstracts of these instructions. Those interested in the requirements of any particular state board can undoubtedly obtain copies of the instructions on application.

Alabama. The law requires "complete plans and specifications and a statement containing a general description of the proposed water supply system, or of the proposed changes in the existing system, showing the geographical location thereof with relation to the source of water supply, and the manner of storage, purification or treatment proposed,—and all the sanitary and health conditions surrounding and affecting said supply and the works, system and plant." The board does not further specify the form of reports or the scale and size of maps and plans.

Arkansas. The Arkansas requirements are very specific as to plans. Plans must be submitted at least two weeks prior to the date upon which action by the board is desired.

For *water works* there must be submitted:—

(a) A general plan of the municipality or district, showing the proposed system.

(b) Detailed drawings showing construction of any special structures in the distribution system.

(c) General and detailed plans for the water purification works.

(d) A comprehensive report upon the proposed system by the designing or consulting engineer. This report to be written upon letter-size paper and the sheets firmly bound together. A preliminary report, containing data and information sufficient for the complete understanding of the project may be sub-

mitted to the State Board of Health for their consideration, prior to the submission of detailed plans.

The map must be drawn to a scale not greater than 100 nor less than 300 feet to one inch, covering the entire area are to be supplied. If the area exceeds two miles in any direction the map may be divided into sections, bound together, with a small index map. Detailed instructions are given as to what this map must show (streets, elevations, pipes, valves, hydrants, etc.) Detail drawings must be furnished, preferably on sheets 20 or 31 inches high and 24, 32, 40 or 48 inches long. The titles must contain name of municipality or other owner and of engineer, date, scale and explanation of symbols, etc.

An engineer's report is required, giving all data upon which the design is based or that may be required for complete understanding of the plans. "If no purification process is provided, the nature and extent of the water shed, with special reference to its sanitary condition, shall be fully and explicitly discussed, together with proposed methods and regulations for the prevention of accidental or other pollutions." Specific, detailed information must be given concerning wells or collecting galleries, the purification plant, pumping plant, the population to be served, and other elements of the problem; and specifications and estimate of cost.

For *sewerage systems* there must be furnished a map of the municipality or district, profiles of all sewers proposed, details of appurtenances, plans of disposal works, and a comprehensive report, typewritten on letter-size sheets firmly bound together. A preliminary report may be submitted prior to the submission of the detailed plans. In general, only plans for the separate system of sewers will be approved. The requirements for the map as to scale are the same as for water works. It shall show contours at intervals of not more than 10 feet and elevations at street intersections; location of existing and proposed sewers; average elevation of water in streams and direction of their flow, elevation of highest known freshets at outlets, etc. Sewers to be built at present shall be shown by solid lines; sewers to be constructed later, by dashes; existing sanitary sewers by dots and existing combined sewers by dots and dashes. The topographical symbols are to be those of the U. S. Geological Survey. Elevations of streets should be placed outside the street lines in the upper right angle or opposite their positions. Elevations of sewer inverts should be shown at street intersections and wherever a change of grade occurs, written between the street lines. Surface elevations should be shown to the nearest tenth of a foot and sewer elevations to the nearest thousandth. All appurtenances shall be shown by suitable symbols.

For profiles the scales recommended are 10 feet to 1 inch vertically and the same scale as the map horizontally. Profiles are to show manholes, flush tanks, lampholes, siphons and stream crossings; figures indicating sizes and gradients of sewers, surface elevations, sewer inverts. Plans under profiles should show lot and street lines, locations of Y's, cuts, etc.

As minimum grades there are suggested a fall for 100 ft. of 0.60 feet for 6-inch sewers; .40 ft. for 8-inch; .29 ft. for 10-inch; .22 ft. for 12-inch, etc., and if lower grades are used an explanation is required. Each profile sheet is to contain an index of the streets appearing on that sheet, and sheets are to be numbered consecutively.

Detail plans are required of sections of sewers other than clay or iron and of all appurtenances; of the disposal works and of a disinfecting plant. The last shall show longitudinal and transverse sections of each unit, distributing and drainage systems, etc.

The dimensions suggested, except for the map, are the same as for water works.

The report shall give all data upon which the design is based, including a description of the area to be sewered; population, present and 25 years hence; estimated daily flow of sewage; present water consumption; allowance for leakage; character of sewage; method of flushing; minimum grades; treatment of sections too low to drain by gravity; list of bench marks. The description of the disposal plant is to cover the method adopted, rate of operation of each unit, provisions for reserves, dry-weather flow of stream receiving effluent, disposal of sludge, local conditions affecting the design, special devices, kind of disinfectant and rate of use, maintenance and operation.

There shall be submitted specifications and estimate of cost giving unit prices; except that specifications may be omitted when extensions are to be made under specifications previously filed.

Applications for approval of plans shall be made on blanks furnished by the board.

The above is one of the most elaborate and detailed sets of instructions, as that of Alabama is one of the most general and brief.

California. The requirements of California resemble in general those of Arkansas, modified to suit local conditions. For example, under water supply, more attention is directed to dams and reservoirs. In these instructions more detailed attention is given to water purification and sewage treatment. The latter require, in the case of tanks, a statement of the average settling period, maximum velocity of flow through, provision for reversal of flow, discussion of excessive gas formation, sludge removal, mosquito nuisance, short circuits when tanks are pumped, area of sludge beds per capita, frequency of dosing filters. If disposal is on land, the acreage and application rate, kind and depth of soil strata, ground-water level, underdrainage, "provision for management of farm, responsibility for its management, provisions for rest and cultivation, crops to be grown, disposition of such crops, disposition of sewage in wet seasons, possibility of sewage reaching any stream or body of water at any time of year," must be described.

The other states will be considered in alphabetical order in future instalments of this series of articles.

Extensive Highway Construction

The North Carolina State Highway Commission has planned for one thousand miles of roadwork to be placed under contract this year. During the first two months of 1922 approximately 235 miles were contracted for in January and February, as follows: Sand clay, topsoil, and gravel, 125 miles; macadam, including all types, 28 miles; concrete, plain and reinforced, 30 miles; asphaltic concrete, 52 miles. The cost of work under contract or under construction had passed the $20,000,000 mark early in March.

Highway Work Done During 1921—Continued

County and State	Money spent for highway work	Kinds and amounts of highway construction
New York		
Cayuga	634,625	13 mi. conc., 17 bitum. mac., 11 W. B. mac.
Chautauqua	100,000	Rein. conc.
Niagara	600,000	14 mi. conc., 12 mac., 25 stn.
Oswego	610,000	28.9 mi. bitum. mac.
Schenectady	138,000	2 mi. bit. mac., 4 W. B. mac.
Schuyler	42,960	3½ bit. mac. incomplete
Tompkins	201,000	5.54 mi. rein. conc., 4.99 to let
Yates	400,000	Bitum. mac.
North Carolina		
Bertie	45,000	Soil roads maintained
Forsyth	300,000	Conc. & top soil
Graham	22,000	
Lenoir	1,400,000	35 mi. sheet asph. on 5-in. conc. base
Mitchell	.....	5 mi. conc. contracted, 2 built
Surry	.....	Sand-clay
Washington	75,000	None
Wilson	121,479	Gravel $26,000; top soil $25,000
Yancey	175,000	Grading only
North Dakota		
Barnes	136,000	8 mi. gravel $16,000
Cass	150,000	8 mi. gravel
Grand Forks	143,763	½ mi. conc., 8 mi. light gravel surf.
Grant	120,000	10 mi. w. bridges, $70,000, (100 mi. earth $20,000), bridges, $30,000
Hettinger	200,000	7.92 mi. fed. aid proj.
McKenzie	15,000	Maint. & repairs
Mountrail	200,000	Dirt surf.
Ward	94,472	Earth $40,000, gravel $46,000
Williams	90,000	90 mi. earth rd.
Ohio		
Allen	270,000	2 mi. W. B. mac., 2 Willite on mac., 2 mi. mac.
Ashland	625,000	14.5 mi. brick, 2½ asph.
Ashtabula	660,000	6 mi. cinder., 22.2 mi. bituminous mac.
Fairfield	405,000	3 mi. tar bit., 2 mi. brick
Fulton	286,860	Conc. & W. B. mac.
Hancock	950,000	Conc., asph., asph. conc. & mac.
Hardin	200,000	2.08 mi. Ky. rock asph., 25 mi. bit. mac., 6 stone
Holmes	461,300	9.4 grad. & bridges, 2.88 gravel, 1.17 asph., 5.08 conc., 2.67 brk., 1.75 mac.
Logan	285,000	15 mi. gravel, 2 stone, 3½ conc.
Meigs	64,000	3 mi. tar-bound mac., ¾ conc.
Mercer	400,000	$275,000 conc., $100,000 stone & gravel
Ottawa	281,000	Conc.
Pickaway	60,000	Resurf. tar mac.
Pike	103,673	12 mi. gravel, 8 mi. conc.
Putnam	235,000	
Sandusky	450,000	10 mi. brk., 1 conc.
Shelby	360,000	6 mi. conc., 22 gravel & loose stone
Williams	500,000	4 mi. Willite, 4 bit mac., ½ conc., 6 W. B. mac., 3 Ky. rock
Oklahoma		
Carter	550,000	18 mi. gravel, 6½ Telford resurf., 10 sand-clay, 2 oil
Ellis	17,000	15 dirt rds.
Garfield	300,000	4 mi. conc. with Topeka top
Grady	215,000	Earth surface & clay on sandy places
Jackson	64,500	Sand clay, $1,500
Major	6,000	Earth grading
Oregon		
Grant	130,000	10 mi. dirt rds., 18 mi. graveled, surf. only
Marion	950,000	Conc., asph. conc., mac. & gravel
Pennsylvania		
Delaware	65,000	$25,000 new Tarvia rds.
Erie	700,000	Rein. conc.
Jefferson	200,000	2 mi. conc., 2 mi. graded, & 3 mi. former wk. completed
Lackawanna	145,000	Conc. rds.
Monroe	.....	10 mi. conc. $750,000, 1 mac. $6,500
Warren	400,000	8 mi. conc.
South Carolina		
Aiken	25,000	Sand-clay & gravel
Anderson	1,850,000	248 mi.—10 mi. asph. conc., 238 top soil
Cherokee	30,000	Top soil
Chesterfield	96,000	21 mi. gravel, 9 top soil
Greenwood	163,560	30.1 mi. top soil, 0.264 mi. conc.

County and State	Money spent for highway work	Kinds and amounts of highway construction
South Dakota		
Clay	152,000	All dirt
Codington	90,170	34 mi. earth
Custer	250,000	6 mi. crushed granite, rest dirt
Day	245,008	28 mi. gravel, 5 earth
Douglas	27,392	27 mi. blade grad., 50,000 yds. fills, 6 mi. graded for gravel
Faulk	.....	10 mi. dirt.
Gregory	210,000	3 mi. covered magnesia
Haakon	110,000	Dirt road
Hanson	146,000	$85,000 gravel, $25,000 bridges, balance dirt
Jackson	27,000	130 mi. dirt rds.
McCook	75,000	Dirt—will gravel 60 mi. this year
Meade	120,366	None
Miner	32,246	72. mi. clay surf.
Roberts	125,000	38 mi. dirt graded; $33,000 bridges
Spink	.....	12 mi. gravel surf., 85 earth, 3 graveled
Sully	110,000	Earth; $35,000 bridges
Yankton	172,098	40 mi. earth, 3 gravel
Tennessee		
Bedford	100,000	W. B. mac.
Bradley	7,000	None
Claiborne	125,000	15 mi. W. B. mac., 10 grad.
Cocke	50,000	$6,000 gravel surf, $20,000 W. B. mac.
Coffee	20,000	Gravel
Cumberland	3,000	None
Grundy	10,000	None
Hamilton	300,000	4 mi. cem. conc., 20 asph. oil surf.
Hawkins	300,000	Grading
Lewis	38,000	10 mi. graded rd, 5 chert surf.
Montgomery	90,000	4 mi. mac. oil surf., 3 mi. penetration, 8 gravel
Moore	25,000	W. B. mac.
Rutherford	380,000	12 mi. pen. w. Telford base
White	135,000	11 mi. surf., 3 mi. base, 6 mac.
Williamson	60,000	Mac., gravel, earth
Texas		
Aransas	33,416	22 mi. shell, 10 sand clay, 14 earth graded
Colorado	50,000	Gravel
Comanche	92,400	$92,400 gravel, incl. grad. & bridges
Johnson	1,000,000	90 mi. gravel
Madison	70,000	10 mi. earth rd.
Newton	10,000	None
Rockwall	450,000	$300,000 conc. rd., $150,000 earth rds. & bridges
Smith	800,000	6 mi. conc., 70 gravel
Tarrant	2,000,000	$350,000 conc., $650,000 rock asph., $200,000 asph. pen., $800,000 gravel., incl. structures
Wichita	1,000,000	30 mi. 18-ft. conc.
Wise	38,000	5 mi. shell gravel surf., incl. grad. & structures
Virginia		
Augusta	452,000	40 mi. W. B. mac.
Fairfax	200,000	5 mi. bit. mac., 5 gravel
Halifax	100,000	Soil only
Scott	200,000	5 W. B. mac., 50 mi. graded
Washington		
Asotin	70,000	7 mi. crushed rock, 8 grad.
Clallam	200,000	20 mi. gravel
Douglas	27,000	3.1 mi. graded, $10,000; 11 resurf. gravel, $17,000
Grant	250,000	38 mi. gravel surf.
Grays Harbor	950,000	10 mi. conc., 6½ mi. plank, rest gravel
Island	45,000	3 mi. gravel
Jefferson	160,000	7 mi. gravel rds.
Lewis	521,884	4.1 mi. 18-ft. conc., $142,863
Lincoln	339,000	33 mi. crushed gravel and crushed rock
Okanogan	176,000	Gravel surf.
Pierce	500,000	25.86 mi. conc.
San Juan	5,010	8,000 ft. 9-in. gravel
Snohomish	500,000	6.5 mi. 20-ft. 1-course conc., $120,000; 15 mi. grad. & gravel, $100.000; maint., $200,000; bridges, $80,000
Whitman	619,552	$231,903.66 for mac. surf.
West Virginia		
Broxton	161,477	Grad. earth rds.
Brooke	409,194	28,161 sq. yds. conc., 17,601 gravel, 15,840 mac., 32,854 pen. mac., 32,854 cinders
Hancock	130,111	3.86 mi. brick, 1.52 conc.
Kanawha	600,000	Grading

Highway Work Done During 1921

County and State	Money spent for highway work	Kinds and amounts of highway construction
West Virginia (Continued)		
Mason	150,000	2½ mi. conc., 5 gravel
McDowell	400,000	Ky. rock asph. & grading earth rds.
Mineral	165,920	10 mi. earth rds., 2 surf. with shale
Monongalia	520,000	Conc.
Polk	60,000	Dirt & gravel
Upshur	142,000	3.5 mi. conc.
Wyoming	125,000	Dirt
Wisconsin		
Adams	80,000	15 mi. clay, 1½ gravel
Brown	1,210,000	27 mi. conc. rds., 30 gravel surf.
Buffalo	141,620	Shale covered with sand & gravel
Fond du Lac	776,238	17 mi. conc. 20 gravel
Forest	166,500	Earth & gravel
Grant	339,271	23¼ earth, 7 gravel, 1 conc.
Jefferson	630,000	8½ mi. conc., 12 gravel, 4 grad.
Juneau	127,871	30 clay, 5 gravel
La Crosse	491,616	142,872 sq. yds. tar mac.
Lincoln	171,483	38 mi. grad., 13 gravel
Monroe	308,000	$76,000 shale, $175,000 grad. & shaling
Price	188,000	$20,000 gravel
Sawyer	97,000	18 mi. grad. & gravel
Vernon	348,000	3½ mi. Tarvia pen. 18 ft. wide, 19 mi. earth
Walworth	946,050	24 mi. conc., 18.1 mi. gravel
Waukesha	150,000	Conc. pav. & gravel
Winnebago	644,777	$469,743 conc., $3,541 gravel, $34,594 mac.
Wyoming		
Lincoln	120,000	2½ mi. gravel surf., 40 graded bridges
Weston	45,000	75 mi. tractor graded, 3 earth

Wage Increases in Recent Years

The tendency of the war period in the United States has been to greatly decrease the purchasing value of the earnings of relatively high-salaried people and to increase that of the mechanic and laborers; mechanics' wages generally keeping on a par with the increase of living and those of unskilled laborers gaining considerable increase over the 1915 to 1922. It shows a wide variation of the actual amount of wages paid and a great reduction from the peak of 1920.

Another diagram of wages in the same geographical sections shows the percentage of changes as compared with cost of living. In all but one of the districts, increases went higher than the cost of living during 1920, in all of them the wages were above the cost of living in 1921, and except in the Pacific section they have now dropped below the cost of living. (The wages are actual, while the cost of living is assumed or theoretical, and is probably taken on a basis of high theoretical standards, which is not in the diagram differentiated for separate districts, but is some kind of average for them all and thus may not show fair comparisons in all cases.—Ed.)

Present wages and before-the-war wages for mechanics and building workers are shown in the tables giving hourly wages for common labor and twelve different kinds of skilled labor in five principal typical cities in widely separated portions of the country, as determined by the United States Department of Labor. From it, the Associated General Contractors of America concludes that "it is clear that the wages now being received by some of the trades enable them to buy more of the good things of life than they could with the pre-war wages, while in other cases the present wage will purchase a considerable poorer living than the wage which ruled in 1914.

"Workers in the building trades in Washington, D. C., have thus far been decidedly more successful than those in other places in boosting their effective wages above the pre-war standards. Everyone of the twelve Washington grades shown in the diagram are receiving wages which, in purchasing power, are considerably in excess of the wages prevailing in 1914.

"The present wages shown in the table for Chicago are those established by the Landis decision."

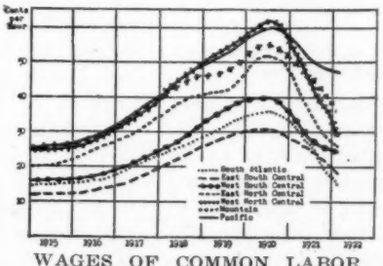
Comparative Table of Wages in 1914 and 1922

	Boston			Baltimore			Chicago			Los Angeles			Washington		
	Wages per Hour		P.C. of 1914	Wages per Hour		P.C. of 1914	Wages per Hour		P.C. of 1914	Wages per Hour		P.C. of 1914	Wages per Hour		P.C. of 1914
Artisans:	1914	1922	Wages	1914	1922	Wages	1914	1922	Wages	1914	1922	Wages	1914	1922	Wages
Plumbers	.650	.900	138	.500	.937	187	.500	.787	157	.563	1.125	200	.313	.594	190
Bricklayers	.650	.900	138	.625	1.250	200	...	...	...	.375	1.125	300	.256	.594	232
Plasterers	.650	.900	138	.625	1.250	200	.700	.950	136	.438	.875	200	.500	1.000	200
Struct. Iron Workers	.625	.900	144	.563	.950	169	.650	1.000	154	.500	1.000	200	.500	1.050	210
Cement Finishers	.625	.900	144	...	...	...	...	...	...	.500	1.000	200	.600	1.060	177
Stone Cutters	.563	.900	160	.500	1.000	200	...	...	...	.563	1.062	189	.500	1.000	200
Laborers	.350	.575	164	...	...	...	...	...	...	.344	.550	154	.250	.425	170
Sheet Metal Workers	.550	.900	164	.400	.800	200	.625	1.025	164	...	...	...	.540	1.000	185
Electricians	.550	.900	164	.438	1.000	228	.650	.850	131	600	1.000	167	...	...	...
Carpenters	.550	.900	164	.438	.800	182	.680	1.050	155	.500	1.000	200	.625	1.250	200
Painters	.525	.900	171	.375	.800	213	.750	1.100	147	.750	1.250	167	.625	1.250	200
Hod Carriers	.350	.600	172	.313	.750	239	.750	1.100	147	.750	1.250	167	.667	1.250	185
Plasterers' Helpers	.407	.700	172	...	...	...	.750	.950	127	.563	1.125	200	.562	1.050	189
								.600							

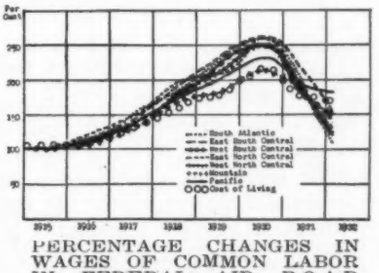
cost of living, which increase in some cases has been retained and in some cases has been largely lost.

One of the accompanying diagrams shows the curves of the wages paid common labor in road construction on Federal Aid Road Projects in different geographical sections of the United States from

*Abstracted from data presented in Index published by Association General Contractors, Washington, D. C.



WAGES OF COMMON LABOR IN FEDERAL AID ROAD WORK SINCE 1914.



PERCENTAGE CHANGES IN WAGES OF COMMON LABOR IN FEDERAL AID ROAD WORK COMPARED WITH COST OF LIVING.

Recent Legal Decisions

BRIDGING TEMPORARY DEFECTS IN SIDEWALKS

In an action for personal injuries against a city, it was held, Wasson v. City of Sedalia (Mo. App.) 236 S. W. 399, that two boards "laid over" a ditch a foot wide and a foot deep, in the brick pavement, which warp and sag into the shape of a hog trough, and do not remain in position, are not ordinarily reasonably secure; but an instruction which covered the case and directed a verdict for the plaintiff, without submitting the issues of whether the sidewalk was rendered dangerous and not reasonably safe, and of whether the city had constructive notice thereof a reasonable length of time before the injury sufficient to have enabled it, in the exercise of ordinary care, to remedy the situation, was held reversible error.

NECESSITY FOR CERTIFICATE FOR STREET WORK PERFORMED—STATUTORY OR COMMON LAW BONDS

Where a contract for street grading provides for payment of monthly installments for the work "as shown by the certificate of the street committee." the Washington Supreme Court holds, Smith vs. Town of Tukwila, 203 Pac. 369, that the contractor could not recover such installments without such certificates unless they had been unfairly withheld. A statement by a member of the committee to the town council as to the amount due the contractor would not suffice.

It was also held that if the state statutes providing for a bond for public works do not compel the municipality to exact the bond therein provided for, or provide that any other bond will be without effect, and the town takes a common-law instead of the statutory bond, the bondsman will be liable thereon, on the contractor's default.

MUNICIPAL REGULATION OF SIGN BOARDS IN STREETS

The Oregon Supreme Court holds, City of Portland vs. Yates, 203 Pac. 319, that if a sign in a street in front of property, which has been properly constructed under a permit issued in pursuance of an ordinance, should become objectionable or unsafe, or under changed conditions should interfere with the use of the street or sidewalk, and it becomes necessary, in the exercise of the police power, to remove it, the city would have authority to take proper proceedings to abate the nuisance, or remove the obstruction. Stated differently, the public right in the street is paramount, and the abutter's right to proper use of the street in front of his property is subject to reasonable municipal and police regulation.

JURISDICTION OF BOARD OF PUBLIC WORKS IN ORDERING STREET IMPROVEMENTS

A board of public works, as authorized by a general street improvement ordinance, adopted an ordinance ordering certain street improvements to be done under its supervision. Subsequently the latter ordinance was repealed. It was held, in an action to foreclose a street assessment lien, Fay Improvement Co. vs. Nelson, 203 Pac. 417, that this did not deprive the board of jurisdiction to pass another ordinance ordering the improvements to be made, in the absence of a showing that anyone was or would be injured by the delay in ordering and proceeding with the improvements.

MINORS NOT EXCEPTED FROM STATUTORY REQUIREMENT AS TO NOTICE OF INJURIES

The Colorado statute requiring notice of time, place and cause of injuries to be given within 90 days from the occurrence of an accident for which compensation is sought from a city as a condition precedent to recovery is mandatory; and the Circuit Court of Appeals, Eighth Circuit, holds, Baker vs. Town of Manitou, 277 Fed. 232, that failure to give notice is not excused because the injured person is a minor, and was confined to bed for the whole period of 90 days. Under statutes similar to this, it has been held that it is not the province of courts to make exceptions where the legislature has made none. Peoples vs. City of Valparaiso, 178 Ind. 673. Ellis vs. City of Kearney, 80 Neb. 51.

OREGON STAUTE AUTHORIZING ORDINANCES REGULATING KEEPING OF DOGS HELD VALID

The Oregon Supreme Court holds, Hofer vs. Carson, 203 Pac. 323, that Oregon Gen. Laws 1919, p. 273, authorizing the passage of ordinances for the summary destruction of unmuzzled dogs without notice to the owner is not unconstitutional as depriving the owner of his property without due process of law, although dogs are recognized as property under the Oregon statutes. The provision of the statute authorizing cities to provide dog license fees to create a fund to reimburse owners of sheep and other domestic animals in the county for losses sustained through the death or injury of such animals caused by dogs is held not unconstitutional as granting special privileges to the owners of such animals, the act merely requiring the owners of dogs to make good the ravages of dangerous animals kept by them.

WATER RATES CHARGEABLE BY MUNICIPALITY NOT SUBJECT TO REGULATION BY CALIFORNIA

Following the decision of the California Supreme Court in City of Pasadena v. Railroad Commission, 192 Pac. 25, the California Court of Appeals, Second District, holds, Johimsen v. City of Los Angeles, 202 Pac. 902, that section 23 of article 12 of the Constitution of California, giving the Railroad Commission power and jurisdiction to supervise public utility and fix rates therefor, was not intended to and does not vest in the Railroad Commission authority to regulate the rates to be charged by the city of Los Angeles in the sale of water to its inhabitants. The section of the Constitution does not deny the equal protection of the laws to public utilities, though construed as inapplicable to municipally owned public utilities, for the reason that a municipality engaged in the business of furnishing water for public use is not engaged in such business under the same conditions as those pertaining to a private corporation or person furnishing water to the public.

NEWS OF THE SOCIETIES

CALENDAR

May 8-12—AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Atlanta, Georgia.

May 9—SOCIETY OF INDUSTRIAL ENGINEERS. Auditorium Hotel, Chicago.

May 9-11—NATIONAL FIRE PROTECTION ASSOCIATION. Annual meeting. Atlantic City, N. J.

May 12—NATIONAL HIGHWAY TRAFFIC ASSOCIATION. Annual meeting. Automobile Club of America, New York City.

May 15-16—FLORIDA ENGINEERING SOCIETY. Daytona, Fla.

May 15-19—AMERICAN WATER WORKS ASSOCIATION. 42d annual convention. Bellevue-Stratford Hotel, Philadelphia. Secretary, J. M. Diven, 153 W. 71st St., New York.

May 15-19—NATIONAL ELECTRIC LIGHT ASSOCIATION. Annual convention. Atlantic City, N. J.

May 16-18—CHAMBER OF COMMERCE OF U. S. A. 10th annual meeting Washington, D. C.

May 17—UTAH SOCIETY OF ENGINEERS. University Club, Salt Lake City.

May 17-18—LEAGUE OF TEXAS MUNICIPALITIES. Annual convention. Waxahachie, Tex. Secretary, F. M. Stewart, University of Texas, Austin.

May 22-25—STATE PARK SECOND NATIONAL CONFERENCE, Bear Mountain Inn, Palisades Interstate Park, N. Y. Secretary Edgar E. Harlan, Des Moines, Iowa.

June 4-6—AMERICAN ASSOCIATION OF ENGINEERS. 8th annual convention. Salt Lake City, Utah.

June 5-7—NATIONAL CONFERENCE ON CITY PLANNING. Annual conference. Springfield, Mass. Secretary, F. Shurtleff. 60 State St., Boston, Mass.

June 6-8—CONFERENCE OF NEW YORK STATE MAYORS AND OTHER CITY OFFICIALS. Annual meeting. Poughkeepsie, N. Y. Secretary, W. P. Capes, 25 Washington Ave., Albany, N. Y.

June 7—NORTHWEST SECTION, NATIONAL ELECTRIC LIGHT AND POWER ASSOCIATION. Boise, Ida.

June 13-16—CANADIAN GOOD ROADS ASSOCIATION. Annual convention. Victoria, B. C.

June 19-22—AMERICAN INSTITUTE OF CHEMICAL ENGINEERS. Summer meeting. Clifton Hotel, Niagara Falls.

June 20-23—SOCIETY FOR THE PROMOTION OF ENGINEERING EDUCATION. Annual convention. University of Illinois.

June 21-22—AMERICAN SOCIETY OF CIVIL ENGINEERS. Annual convention. Portsmouth, N. H.

June 26-30—AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. Annual convention. Niagara Falls, Ont.

June 26-July 1—AMERICAN SOCIETY FOR TESTING MATERIALS. 25th annual meeting. Chalfonte-Haddon Hall Hotel, Atlantic City, N. J.

Aug. 28-Sept. 2—NATIONAL SAFETY CONGRESS. Detroit, Mich.

Sept. 11-15—ASSOCIATION OF IRON AND STEEL ELECTRICAL ENGINEERS. New Auditorium, Cleveland, Ohio.

Sept. 25-28—SOUTHWEST WATER WORKS ASSOCIATION. Annual convention. Hot Springs, Ark.

Oct. 9-13—AMERICAN SOCIETY FOR MUNICIPAL IMPROVEMENTS. Annual convention. Cleveland, Ohio.

Oct. 16-19—AMERICAN PUBLIC HEALTH ASSOCIATION. Annual meeting. Cleveland, Ohio.

Nov. 15-16—NATIONAL INDUSTRIAL LEAGUE. Annual meeting. New York City. Secretary, J. H. Beek, Chicago.

SOCIETY OF INDUSTRIAL ENGINEERS

A meeting of the Society of Industrial Engineers will be held at the Auditorium Hotel, Chicago, on May 9. Subject, "Stabilization of Labor."

AMERICAN WATER WORKS ASSOCIATION

Annual Convention May 15, Bellevue-Stratford Hotel, Philadelphia. Group Meetings: 1. Office records, methods, accounts, etc. 2. Pumping station, engines, boilers, firing, etc. 3. Filter plant, operation, care, etc. 4. Pipe laying, methods, records, etc. 5. Services and meters, material of services, laying, meter setting, reading and care. 6. Water sheds and reservoirs, care, algae treatment, tree planting, etc. 7. Private fire protection services. Especially inter-connection with polluted sources and the efficiency of double check valves on such services.

Evening—President's address; reception and dance, Clover Room.

May 16, Forenoon Session—Announcement of officers elected for 1922-1923; general and new business; report of Publication Committee; report of Finance Committee; "Philadelphia Water Supply, Present and Proposed" (lantern slides), George W. Fuller; "Fire Prevention and Fire Protection in Relation to Public Water Supply," Frank C. Jordan.

Afternoon Session—"Development of the Schoharie Watershed, Catskill Water Supply" (lantern slides), J. Waldo Smith; "The Hetch Hetchy Water Supply" (lantern slides), M. M. O'Shaughnessy; "Construction of the Loch Raven Dam," Wm. A. Megraw; "Twenty Years' Filtration Practice at Manufacturers' Association Program. Albany, New York," G. E. Wilcomb.

Evening Session—Water Works Manufacturers Association Program Moving Pictures showing 20,000 H. P. of high steam pressure being discharged to atmosphere and shut off in 30 seconds by Dean Control. Description by Peter Payne Dean; "Underground Leakage and Its Relation to Mains and Services," Thomas F. Wolfe; "Pneumatic Pumping, Up-to-Date" (lantern slides), John Oliphant.

For the Ladies—Trip to Valley Forge, auspices Water Works Manufacturers Association.

May 17—Theatre party.

May 17, Forenoon Session—Reports of Special Committees: "Standard Form of Contract," J. Waldo Smith, chairman; "Standardization Council," George W. Fuller, chairman; "Industrial Wastes in Relation to Water Supply," Almon A. Fales, chairman; "Water Shed Protection," Theodore DeL. Coffin, chairman; "Problems in the Reforestration of Water Sheds" (lantern slides), George R. Taylor; selection of place for holding the 1923 Convention.

Afternoon—Trip by Delaware River boat to Wilmington and return.

Evening Session—"Some Observations Concerning Wood Pipe," J. W. Ledoux; Report of Committee on Standard Specifications for Cast Iron Pipe and Specials, F. A. Barbour, chairman; "Experience with Cast Iron Water Pipe for Pressures Higher than Allowed by Current Specifications," C. E. Inman; "Centrifugally Cast Iron Pipe," Peter Gillespie, motion pictures and lantern slides.

May 18—Trips to points of local interest and evening card party.

May 18, Forenoon Session—Superintendents' Day. (See p. 308, issue of April 29.) "Water Chlorination Control in Virginia (practical demonstration of control test), L. N. Enslow; report of Committee on Physical Standards for Distribution Systems, G. Gale Dixon, chairman; "Air and Relief Valves," M. M. Borden; "Instances of the Value of a Sanitary Survey," W. P. Mason; "Causes of Failure of Cast Iron Pipe," F. A. McInness; "Topical Discussion of Breaks in Water Mains and on General Subjects."

Afternoon Session—Equipment and Shop Facilities for Maintenance of Water Works Systems" (lantern slides), George E. Cripps; Topical Discussions; "Present Day Tars for Pipe Coatings," W. R. Conard; Topical Discussions, Water, Chemical and Bacteriological section.

Evening Session—"Purification of Water for Industrial Uses" (lantern slides), S. T. Powell; "Lime, Soda and Zoelite Water Softening," A. S. Behrman; "Tubo-Centrifugal Pumps" (lantern slides), Richard Waller. Smoker held in the Bellevue-Stratford Hotel.

May 19, Forenoon Session—Joint session with Chemical and Bacteriological Section. "Plant Control of Chlorination by the Excess Chlorine Method as Employed in New York City's Water Supplies" (lantern slides), Frank E. Hale; "Responsibility of the Water Works Superintendent to Prevent Tastes and Odors Due to Microscopic Organisms" (lantern slides), Wm. W. Brush; "Further Notes on Chlorine Control at Grand Rapids," W. A. Sperry; "Recent Practice in the Removal of Odors by Aeration, Filtration and Other Processes," Norman J. Howard; "Recent Developments in Chlorination" (lantern slides) Wm. J. Orchard.

Afternoon Session—Report of Committee on Meter Schedules, Standardization of Slides, Allen Hazen, chairman; "Steel Pipe," Theodore A. Leisen; "Steel Pipe," G. A. Elliott; "Design, Construction and Operation of a Balancing Reservoir" (lantern slides), Wm. A. Megraw.

Chemical and Bacteriological Section

May 18, Afternoon Session—"Water Softening by Base Exchange," Edward Bartow and Gerald C. Baker; reports of Standards Committees; "Standard

Methods of Water Analysis," Jack J. Hinman, Jr., chairman; "Colloidal Chemistry in Relation to Water Purification," Robert Spurr Weston, chairman; "Testing of Water Works Materials and Supplies," Thaddeus Merriam, chairman.

May 19, Afternoon Session—Symposium on Tastes and Odors: "The Effect of Wastes from Oil Refineries Upon the Operation of the Filter Plant at East Chicago," H. E. Jordan; "Some Observations on Chlorine Tastes and Odors," Wellington Donaldson; "Tastes and Odors from Decomposition and putrefaction of Organic Material in the Maumee River Water" (lantern slides), F. Holman Waring; "Chlorination Prior to Filtration, with Special Reference to Efficiency, Economy and Removal of Excess Chlorine" (lantern slides), Norman J. Howard; "Reactions of Culture Media," George C. Bunker and Henry Schuber.

BROOKLYN ENGINEERS' CLUB

At the informal library talk for Thursday, April 20, by John V. Hogan, consulting engineer of New York, and Fellow and Past President of the Institute of Radio Engineers and Member of the American Institute of Electrical Engineers, addressed the club on "Radio Telephony; What it is, and Commercial and Popular Applications," illustrated with lantern slides and an installation for receiving concerts from broadcasting stations.

NATIONAL HIGHWAY TRAFFIC ASSOCIATION

The sessions of the annual meeting will be held Friday, May 12, in the Assembly Hall of the Automobile Club of America, 247 West 54th street, New York City.

Program—Report of National Committee on Uniform Highway Signs, chairman, Elmer Thompson, secretary Automobile Club of America; report of National Committee on Traffic Capacity and Widths of Highways Outside of Municipalities, chairman, Herschel C. Smith, assistant professor of Highway Engineering and Highway Transport, University of Michigan; report of National Committee on Status of the Construction of Highway Curves and Recommended Practice to Increase Safety to Traffic, chairman, H. Eltinge Breed, consulting highway engineer, New York City; report of Executive Committee on Highway Improvement Creed of the National Highway Traffic Association; annual reports of the secretary, treasurer, executive committee and the board of directors; report of National Committee on Regulations Covering Speeds, Weights and Dimensions of Motor Trucks and Trailers, chairman, George H. Pride, president Heavy Haulage Co., of New York City; report of National Committee on License Fees and Motor Vehicle Taxation, chairman, Henry G. Shirley, chairman Good Roads Board, American Automobile Association; report of National Committee on Highway Transport Franchises, chairman, F. W. Fenn, secretary National Motor Truck Committee, National Automobile Chamber of Commerce; report of National Committee on Highway Transport Clearing Houses, chairman, Tom Snyder, secretary National Association of Commercial Haulers, Indianapolis.

AMERICAN SOCIETY OF CIVIL ENGINEERS

At the regular business meeting, May 3, a paper entitled "The American Mixed-Flow Turbine and Its Setting," by Arthur T. Safford and Edward P. Hamilton, was presented. This paper was published in April "Proceedings," and sketches completely the early development of hydraulic turbine practice in this country. Preceding this presentation a short moving picture film of the Dayton meeting was shown.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS

The spring meeting of the American Society of Mechanical Engineers will be held in Atlanta, May 8-11. Preliminary events took place at Charlottesville, Va., on May 6 and 7, in co-operation with the Virginia section of the A. S. M. E. Immediately following the Atlanta meeting observation tours will be made to points in the south, including Birmingham, Greenville, S. C.; Muscle Shoals and Pensacola, Fla.

EASTERN NEW YORK SECTION, A. S. M. E.

The Eastern New York section of the American Society of Mechanical Engineers held a meeting on April 4 at Schenectady. The meeting was addressed by President Dexter S. Kimball on "Engineering and Citizenship," and by Secretary Calvin W. Rice on "The Progress of the Professional Engineering Societies in Their Participation in World Affairs." A feature of the meeting was a ten-minute radio message sent by President Kimball from Station WGY at 8.30 p. m.

METROPOLITAN SECTION, A. S. M. E.

A joint meeting of the student branches in the Metropolitan district was held on April 7. The subject of the 4 p. m. meeting was "The Port of New York." The speakers were Elihu C. Church and George E. Roberts. This was followed by a buffet supper at 6 p. m., and entertainment from 7.30 to 8 p. m., when another meeting was held on the subject of the "St. Lawrence River Project." Speakers were H. I. Harriman and Dr. Harrison H. Wheaton.

METROPOLITAN SECTION, A. S. M. E.

A joint meeting of the Ordnance divisions, A. S. M. E., A. S. C. E., A. I. E. E. and A. I. M. E., was held on April 14th in the Engineering Societies' Bldg. The subject of this meeting was "The Muscle Shoals Development from an Economic Point of View." Motion pictures of Muscle Shoals development to date were shown and addresses were delivered by Brig. Gen. Harry Taylor on "Muscle Shoals as a Power Producer," C. W. Stowell on "Commercial Nitrates" and Gen. C. C. Williams on "Military Nitrates." The work of the Ordnance division, A. S. M. E., was outlined by Waldo Marshall.

PERSONALS

Stonebreaker, Henry B., has been appointed superintendent of the water department of Steubenville, Ohio.

Merrill, Leland G., city engineer of Parkersburg, W. Va., has resigned to accept a position with the West Virginia State Highway Commission.

Maney, Maurice H., of Dorchester, Mass., has been appointed building commissioner of the building department of the city of Boston.

Conant, E. R., has resigned as town manager of Mansfield, Mass., to become surveyor of the recently created highway department of Manchester, N. H., where he will have charge of street and sewer construction and maintenance, street cleaning and garbage collection and disposal.

Montgomery, Julian, city engineer of Wichita Falls, Texas, has resigned, and his assistant, F. M. Rugely, has been appointed to his position.

Ellison, J. T., chief bridge engineer of the Minnesota State Highway Department, has been appointed assistant state highway commissioner by C. M. Babcock, commissioner.

Dennis, John H., who has been with the state highway department of Michigan for many years, has been appointed county engineer of Genesee county, Mich.

Shoecraft, Ezra, city engineer of Flint, Mich., since 1913, has tendered his resignation, effective May 1.

Fuller, Harvey, city engineer of Chatham, Ont., has been appointed city manager. He will continue as city engineer.

Rowe, George H., assistant engineer of the board of public utilities of Los Angeles, Cal., has been appointed assistant engineer with the California State Road Commission.

Danielson, Frank D., formerly assistant manager of Glencoe, Ill., has been appointed village manager of Hinsdale, Ill.

Miller, David B., has been appointed city engineer of Michigan City, Ind., to succeed D. C. Ford, retired.

Schwarting, W. W., has been appointed General Superintendent of the Hibbing, Minn., city lighting, gas and water works, to succeed Charles Foster, resigned.

New Appliances

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations

HEIL HAND HOISTS

The Heil Hand Hoist, manufactured by the Heil Co., is of very substantial construction, weighs only 290 pounds and occupies only 8 inches of the length of the chassis.

It has been designed to lift loads up to 5 tons. All of the working parts are incased to keep out dirt, it can be operated from the driver's seat and it is geared so that little effort is required to raise the loaded body in approximately one minute, one-half minute longer being necessary to dump the load. The dumping angle varies from 35 to 40 degrees; after dumping, the body returns to normal position by gravity, the downward movement being retarded by the brake.

The cable from the hoisting drum passes over sheaves on the cross head of the hoisting frame and thence to the arms attached to the outside of the dump body so as to secure direct and convenient operation and abundant clearance. The hoist can be mounted on any make of chassis and is quickly installed by the application of four U-bolts. The dump body can be locked at any intermediate point of its elevation, thus making it especially safe for road maintenance work where only part of the load dumps in one place.

HEIL HAND HOIST.

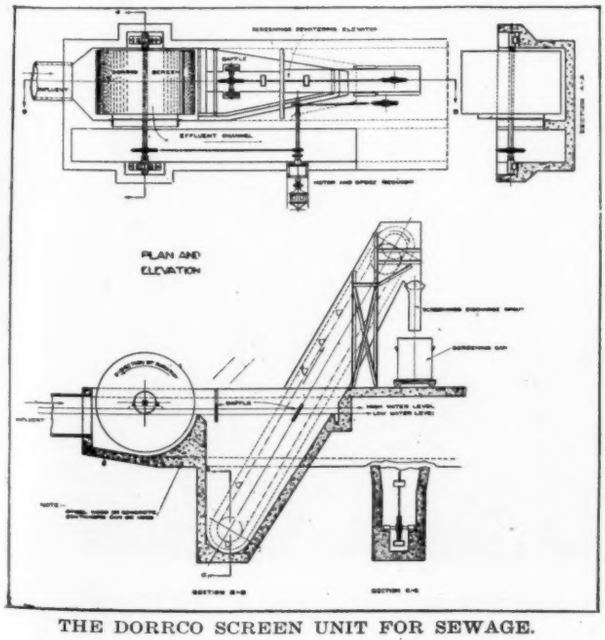
THE DORRCO SCREEN UNIT.

The Dorrco Unit, manufactured by the Dorr Company, removes larger suspended and floating solids in sewage or industrial waste water and is also adapted for removal at the intake of objectionable floating or settleable solids from water for public or private uses. It is claimed to remove probably from 8 to 24 per cent. of the solid suspended matter in sewage and to provide an efficient screening, which is usually the first step for sewage treatment.

The apparatus has been developed to secure the effective preparation of solid and liquid matter without clogging the screen and to dewater it and handle it for final disposal. It is self-cleansing without brushes, scrapers of jets, and combines efficiency with low cost for installation and maintenance and operation.

The screen is a partially submerged, horizontal, cylindrical, revolving drum, into which the screened sewage flows through perforations. The discharge opening is sealed to prevent unscreened sewage from by-passing the screening medium and the action of the screened effluent inside the drum causes spouting which positively cleans the screening medium and delivers the screenings to the screening pit. Where bulky solids are to be removed a lifting fin ejects these solids into the screening pit. The screenings are removed from the screenings pit by a slow-speed, dewatering elevator, which delivers them into cans or carts at a convenient point. The drum usually revolves at a circumferential speed of about 300 feet per minute.

Other advantages are low cost of installation; high efficiency; easy handling of screenings; accessibility; simplicity; durability; self-cleansing, and small area required for installation.



THE DORRCO SCREEN UNIT FOR SEWAGE.

RUSSELL PORTABLE 32-FOOT. CONVEYOR

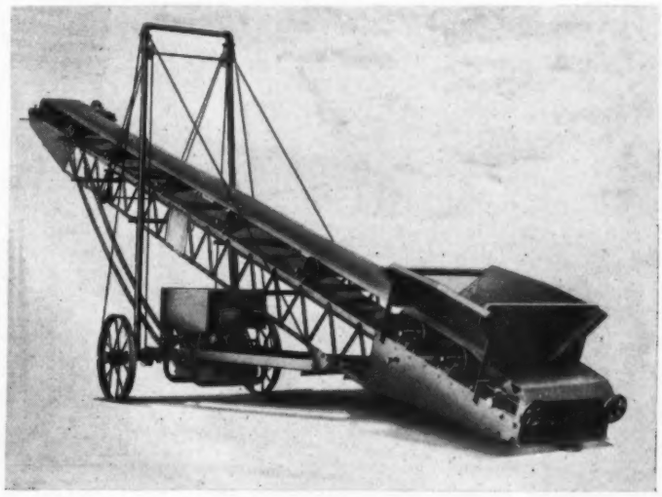
The Russell Grader Mfg. Co. builds a lightweight steel constructed conveyor for loading sand, gravel or crushed rock directly into wagons or trucks. It has an endless 18-inch belt with a hopper attached to the lower end, that is suspended from a gallows frame mounted on wheels. The belt conveyor is driven by a sprocket chain operated by a 3 or 5-horse power gasoline engine under the conveyor.

The conveyor frame, 32 feet long and 26 inches wide, is adjustable through an angle of 30 degrees by a worm gear or crank. Its capacity for gravel or broken stone is 50 yards per hour and it weighs 3,100 pounds.

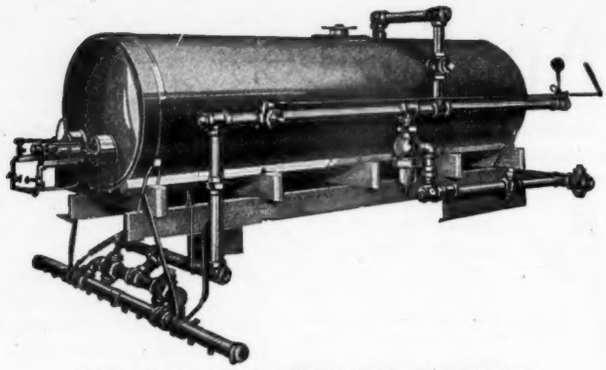
NATIONAL ROAD OILER

The National Road Oiler, manufactured by the National Steel Products Co., is designed to force heavy oils or asphaltic binders into the road surfaces under pressure, in the shortest possible time and with the least expenditure of labor and without loss of material. It consists of a tank and distributing mechanism that when not in service may be removed from the motor truck, leaving the latter available for other services and giving it all-the-year-round efficiency.

The rotary pump and the distribut-



RUSSELL PORTABLE 32-FOOT CONVEYOR.



NATIONAL ROAD OILER FOR PRESSURE APPLICATION.

ing nozzles are the two chief features of mechanical superiority. The pump, which is driven from the truck's transmission, has capacity of 100 gallons per minute against a pressure of 75 pounds per square inch, and it may be operated equally well when the truck is standing still or in motion. The maximum power required for it is 5 h. p. and the speed is 250 rpm.

The nozzles with three different size orifices are made of hard drawn brass and are of special construction that delivers the oil or other liquid in a fan shape spray with high pressure which develops extreme penetrating force. The elimination of adjustable outlets avoids the necessity of an operator at the rear of the machine to look after nozzle adjustments and prevents flooding the roadway with oil.

An air cushion and an automatic relief valve set at any required pressure between the distributing manifold and the pump keeps the pressure at the nozzle uniform regardless of the speed of the truck. The machine is made either with or without a heater in the tank and is constructed so as to agitate the material in the tank while it is being heated.

The tanks are made with capacities of from 500 to 1,250 gallons and can be installed on any truck chassis. They are made with welded joints and the larger sizes are provided with splash plates to prevent the surge of the contents. The pumps are of the positive displacement type providing for continuous flow and not requiring priming. They will lift liquids from a distance of 15 feet below the level of the pump. The special feature of the pump is that the buckets are hung on a rotor so as to ride on the cylinder walls with very light pressure. They take up wear automatically and at all times make perfect seat with the cylinder walls. The distributing manifold is divided in the middle into two sections controlled by valves accessible for cleaning through end caps.

The principal points of superiority claimed include quick and accurate control of all working parts; uniform heating; maximum width of road covered; elimination of wasteful distribution of materials; detachable from truck; accessibility; simplicity and economy of first cost and of operation.

INDUSTRIAL NOTES

The Pennsylvania Pump & Compressor Co. announces the opening of its Chicago office under the management of H. H. Montgomery.

The Chain Belt Co., Milwaukee, Wis., has announced the appointment of G. F. Sherratt as manager of the Pittsburgh office.

The Koehring Co. of Canada, Ltd., has been organized in Toronto to handle Koehring mixers, pavers, cranes and other construction and industrial plant equipment.

The Combustion Engineering Corporation, New York, announces the opening of a new branch office in the Guardian Building, Cleveland, which will be in charge of Frank Henderson.

Because of increasing activity in the power and railway divisions of the Pittsburgh office of the Westinghouse Electric & Mfg. Co., these two divisions have been separated. Barton Steveson, who has been manager of the two divisions, will continue as manager of the power division, and F. G. Hickling has been appointed manager of the railway division. S. R. Shave has been appointed manager of the price section of both the power and railway divisions in the Pittsburgh office.

The Federal Motor Truck Co. announces the establishment of a factory branch at San Francisco, with a completely equipped sales and service plant at 1123 Post street.

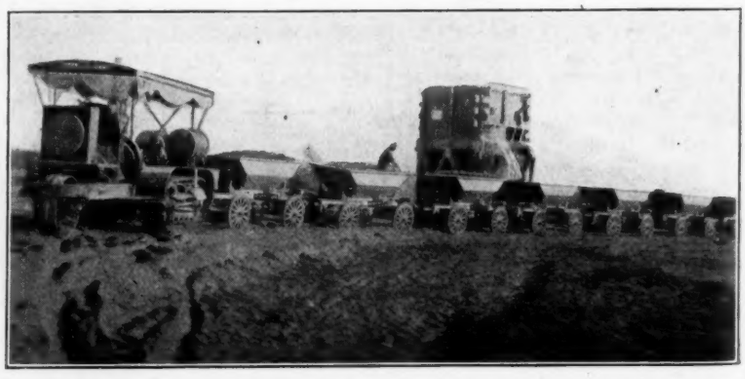
J. Ross Bates is to represent the Orton & Steinbrenner Co., of Chicago and Huntington, manufacturers of locomotive cranes, clam-shell and orange peel buckets and coal crushers, in the New England states and New York city. He has offices at 136 Liberty street, New York city, and 128 School street, Watertown, Mass.

A TRAIN OF TRAILERS ON HIGHWAY WORK

A fleet of 2½-ton, 4-wheel, reversible highway trailers, equipped with 2½-yard bottom dump spreader type bodies, is in use for maintenance and road construction by the Pinal County Highway Commission in Florence, Ariz. Ordinarily they are hauled by 2-ton motor trucks.

Occasionally, however, they are hauled in multiple by a 75-h.p. Holt tractor, which, in the accompanying illustration, is shown pulling a train of seven trailers loaded at a central point with road resurfacing. This method secures the rapid delivery of large quantities of materials into long or short distances and over soft, hard or irregular ground without the delay and expense of installing an industrial track. The system is flexible and its units are always available for operation in different combinations and in different places without involving the necessity for permanent equipment or installation.

In a letter accompanying a photograph, from which the illustration was prepared, the highway engineer, W. W. Lane, stated that they have found the trailers entirely satisfactory in every way.



HOLT 75-H. P. TRACTOR HAULING TRAIN OF SEVEN 2½-TON HIGHWAY TRAILERS.